SMC Martin

900 W. Valley Forge Road
P.O. Box 859
Valley Forge, Pennsylvania 19482
Telephone 215 265-2700 or 783-7480

ORIGINAL (RED)

January 9, 1987
Ref: 8713-94003

Mrs. Mindi Snoparsky
U.S. Environmental Protection Agency
Region III
Site Investigation and Support Section (3HW23)
841 Chestnut Street
Philadelphia, PA 19107

Subject: Monitor Well Installation at
Camdel Metals for the Purpose of
Defining the Permeability and Thickness of the
Clay Underlining the Columbia Aquifer

Dear Mindi:

Pursuant to our previous discussions regarding the thickness and permeability of the clay layer underlying the Columbia Aquifer and EPA's desire to have more definitive site-specific information at Camdel Metals, we are preparing to install a monitor well per the attached specifications. We will proceed with the well installation upon receipt of your comments. The purpose of the monitor well installation will be to define the thickness and permeability of the confining layer separating the Columbia and Fredrica aquifers. This will be accomplished by advancing a boring to the confining layer and collecting shelby tube samples of the confining unit. The well will be completed and screened beneath the confining unit in the Fredrica aquifer.

In order to prevent the introduction of contaminants that may be present in the Columbia Aquifer from entering the Fredrica aquifer, double casing methods will be employed in the construction of this well. In addition, the well will be sited in an upgradient location, on Camdel property, in the vicinity of Monitor Well #15 (Attachment A).

Specifically, a 12-inch diameter boring will be advanced approximately three feet into the clay layer using wet rotary techniques. An 8-inch diameter steel casing will be pushed into place and the annular space between the casing and surrounding soil will be tremie grouted from the bottom to the ground surface using a cement/bentonite mixture. Prior to proceeding with the boring, the mud pan and pumps will be drained and rinsed. Shelby tubes will be collected from the confining zone.

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The boring will be advanced to a depth approximately 10 to 15 feet beneath the confining zone. A four-inch diameter threaded flush joint PVC screen (0.010 slot size) and casing will be installed. A gravel pack will be placed around the screen (#1 Jessie Moore Sand) and a bentonite seal will be placed above the gravel pack into the confining layer. The annular space between the well pipe and surrounding soil and well pipe and the surface steel casing will be tremie grouted to the ground surface using a cement/bentonite grout. Additional well specifications are provided in Attachment B.

After completion of the monitor well, a lithologic log of the well will be prepared using gamma logging techniques. Gamma logging will provide a continuous record of lithology from near the surface to the bottom of the borehole.

If you have any questions or concerns regarding the well installation or should you desire to be present during the installation, please do not hesitate to contact me.

Sincerely,

SMC MARTIN INC.

(b) (4) [redacted]

[redacted]

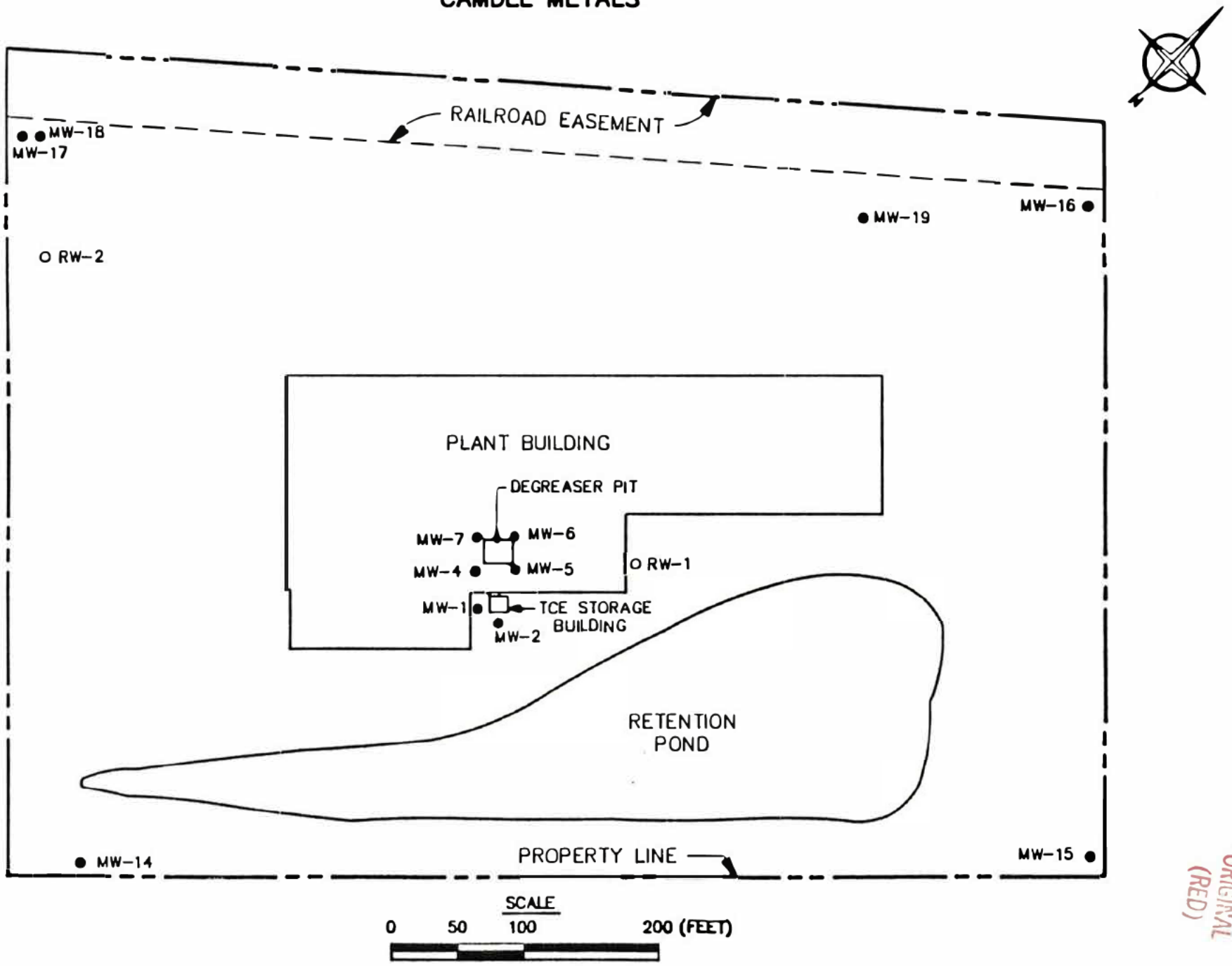
Soil Scientist

SEJ:rm
Enclosures
8713:SEJLlJ

cc: R. H. Zimmermann
T. Walsh
M. Apgar

ATTACHMENT A

MONITOR WELL LOCATIONS
CAMDEL METALS



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CAMDEL METALS
1/6/87

ATTACHMENT B
DOUBLE CASING MONITOR WELL SPECIFICATIONS

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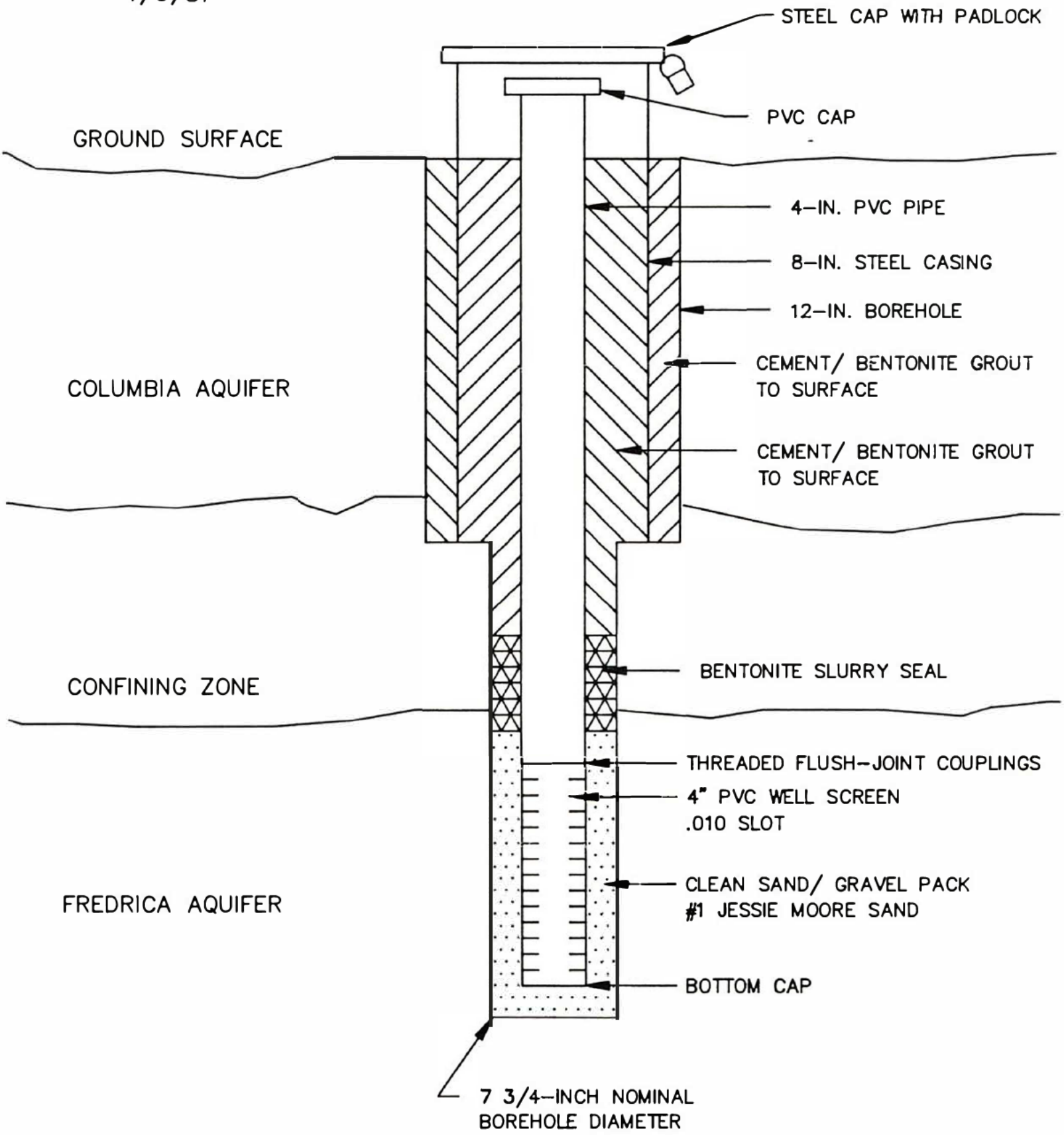

NOT TO SCALE

ORIGINAL (Red)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

DATE: DEC 15 1986

SUBJECT: Hydrogeology within 3-mile radius of Camdel Metals, Camden, Delaware

FROM: Mindi Snoparsky, Geologist
Site Investigation & Support Section (3HW23)

TO: Herbert J. Freiberger, Chief
Mid-Atlantic District U.S.G.S.

THRU: Kenneth R. Kryszczun, Chief
Site Investigation & Support Section (3HW23)

Tom Merski, Groundwater Coordinator
Office of Groundwater (3WM42)

In November 1986, Mike Apgar of the Division of Air and Waste Management, Delaware Department of Natural Resources and Environmental Control (DNREC) requested input from the USGS, through EPA's Cooperative Agreement with USGS, concerning the hydrogeology within the 3-mile radius of Camdel Metals, a potential candidate for the Superfund National Priorities List (NPL). Specifically, the DNREC would like a written opinion by USGS concerning the nature and extent of the sandy confining unit between the Columbia, Frederica and Cheswold aquifers; the relationship between the contaminated surficial aquifer and the deeper confined aquifers; and the probability of contamination reaching the lower aquifers. The USGS should consider this a desktop study based on the attached information and any other currently available information. Written recommendations would also be appreciated.

Presently, SMC Martin Inc., the consultant for Camdel Metals, is setting up a Shelby tube test to define the permeability of the clay beneath the Columbia aquifer, as well as to assess the thickness of the clay (personal communication with (b) (4) [redacted], SMC Martin, December 10, 1986).

In order for EPA deadlines for QA to be met, it is crucial that USGS' evaluation is returned to EPA Region III within 2 weeks of receipt of this memo.

The input of the USGS on this project is greatly appreciated.

For questions, etc — my phone is (215) 597-2365

ORIGINAL
(RED)

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
89 KINGS HIGHWAY
P.O. BOX 1401
DOVER, DELAWARE 19903

WASTE MANAGEMENT
SECTION

TELEPHONE: (302) 736 - 4781

December 12, 1986

Mindi Snoparsky
US EPA III
841 Chestnut Bldg
Philadelphia PA 19107

Dear Ms. ~~Snoparsky~~ Mindi:

At the meeting held between EPA, Camdel, and DNREC on November 19, 1986, we agreed to provide well log information to you which demonstrates the continuity of a hydraulic barrier (confining unit) between the unconfined aquifer in the Columbia Formation and the deeper confined aquifers which are regional sources of public water supply. Accordingly, enclosed are geologic logs from wells which are located in the vicinity of the Camdel site. The interpretation of an extensive confining bed beneath the Camdel site is consistent with USGS reports on the groundwater hydrology of central Kent County. It is our understanding that if the unconfined and deeper confined aquifers are considered not interconnected, the population potentially exposed to contamination by this site is small, the Hazard Ranking Score would be sufficiently low, and the site would not qualify for the National Priority List.

To reiterate our position expressed at our meeting, we do not believe that contaminants introduced at the land surface at Camdel Metals in Camden would ever reach the Cheswold or Piney Point Aquifers (which are the sources of public water supplies). Therefore, we do not believe that Camdel Metals would qualify for the NPL. We do not believe that wells drilled onsite at Camdel Metals would be necessary to support this conclusion.

As a practical matter, the report submitted by Camdel's consultant (SMC Martin) documents that the relatively minor TCE spills which occurred on the site have been remedied to acceptable levels. The contaminants on Camdel's property now represent no significant threat to human health or the environment, because there is no substantiated contamination of water in the unconfined aquifer.

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Per our discussion, we encourage you to seek other expert advice to resolve the matter of aquifer interconnection. As we explained, Delaware law requires registration of geologists in an attempt to encourage competence and ensure accountability for geologic work. The Delaware Geological Survey and U.S. Geological Survey - while not required to be registered - both employ geohydrologists who would be recognized as experts by the State Board of Registration.

As we explained, EPA has an existing memorandum of agreement with the USGS whereby USGS will provide professional technical services on a formally accepted basis to EPA. We encourage EPA to avail itself of the expertise and familiarity USGS personnel have with this area. Although the local USGS branch in Dover (managed by Arthur L. Hodges, Jr.) would likely render any opinion, it would be proper to make the request for such assistance through Herbert J. Freiberger, USGS, District Chief (DE-MD-VA), 208 Carroll Bldg, 8600 LaSalle Rd, Towson, MD 21204 (telephone 301-838-1535).

We urge you to pursue USGS assistance on this and any other projects where advice of geologic experts with long-term personnel familiarity with this area. We are not suggesting that EPA delegate Superfund decisions to USGS, but that the agency would benefit from the advice of widely recognized, unbiased professionals in USGS on technical matters on which the Agency's decisions are based.

We appreciate your receptiveness in openly discussing this matter with us and the company and its consultant prior to making your determination. If we can be of further assistance to you or if you have any questions, do not hesitate to call us at 736-3820.

Sincerely,

(b) (4)

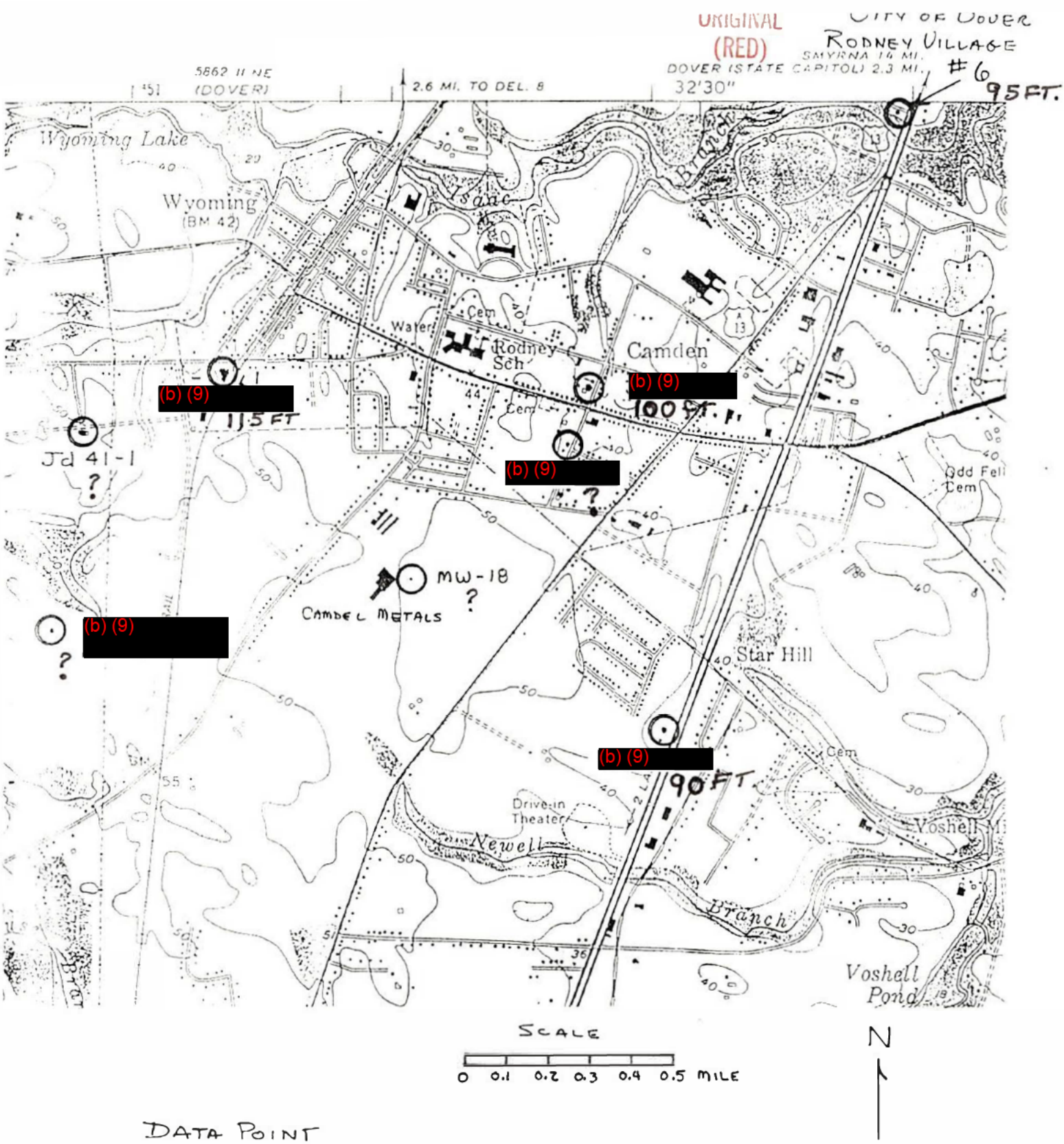
Geohydrologist

(b) (4)

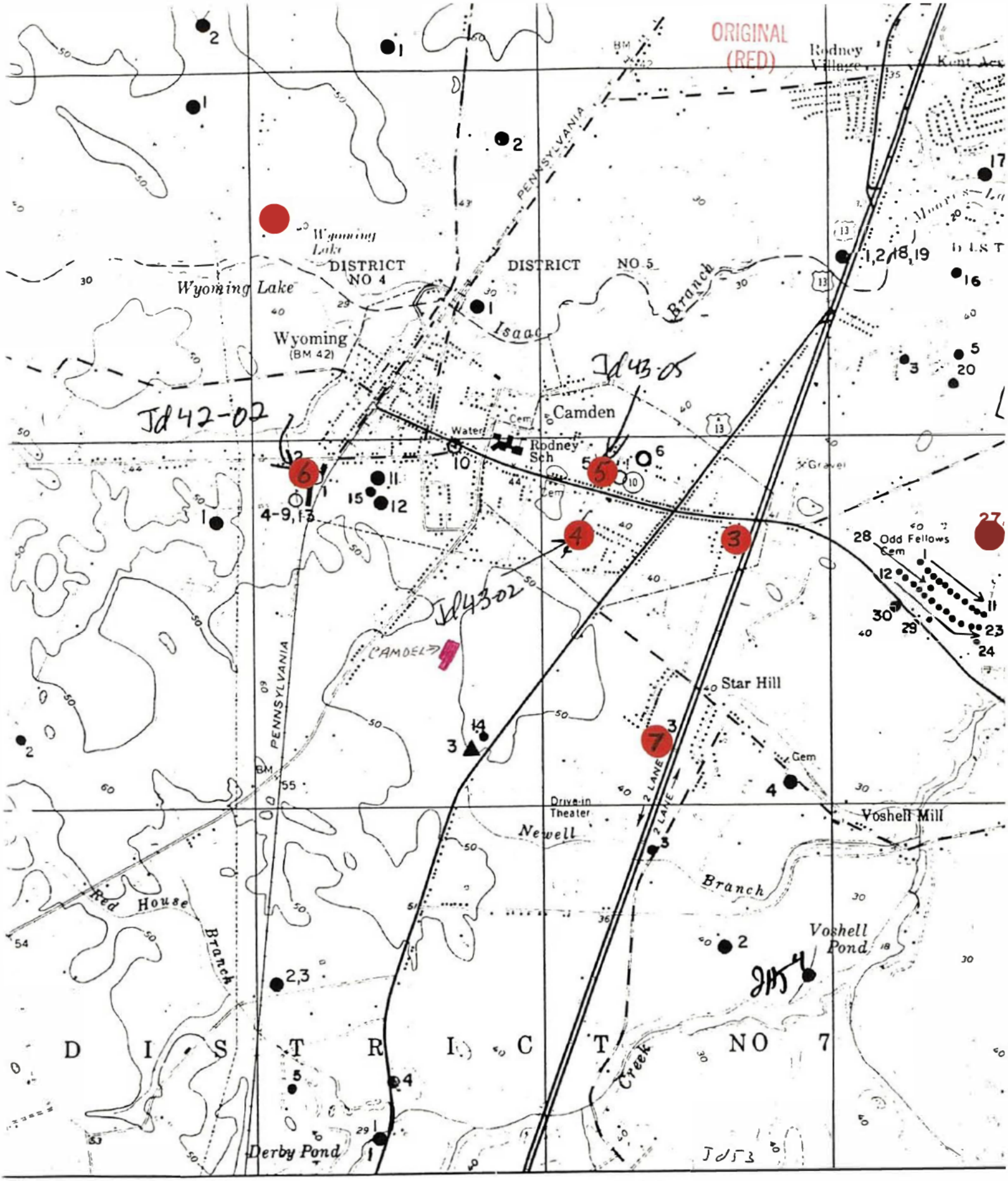
(b) (4), P.G.
Supervisor

jkb

cc: (b) (4), SMC Martin
Robert Zimmerman, Handy & Harmon
Herbert J. Freiberger, USGS
Arthur L. Hodges, Jr., USGS
Kenneth D. Woodruff, DGS
Gary A. Molchan
Brad L. Smith, Jr.



THICKNESS OF THE CONFINING BED BETWEEN THE CHESWOLD AND PINEY POINT AQUIFERS



Well Location Map.

Jd53-1 not spotted

(1)

ORIG (RED)

Press Hard - Write Clearly - Use Ball-Point Pen or Typewriter - Press Hard

Mail To:
Water Supply Section
Division of Environmental Control
Tatnall Building
Dover, Delaware 19901

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
APPLICATION FOR A PERMIT TO DRILL A WELL
To be completed by a licensed water well driller)

APPLICATION MUST BE SUBMITTED AND PERMIT RECEIVED BEFORE DRILLING IS STARTED.

Owner PAPEN FARMS, INC.
Telephone Number: 697-3291
Mailing Address: RD #6
DOVER, DEL. 19901 zip

Date of Application: 7 Mon. 16 Day 76 Year
Estimated Date of Construction: ASAP
Driller: DELMARVA DRILLING License No. 19
Pump Installer: — License No. —

WELL INFORMATION (circle one)
Purpose: Test Well - Permanent Well - Option to convert
Use: Domestic - Public - Commercial
Industrial - Agriculture - Other
Describe Other: —
Is this a replacement well? yes - no
Reason for replacement: [illegible]
Date abandoned well is to be sealed: —
How —
Has an application been made for an approved sewage disposal system? yes (no)
Permit Number: N/A

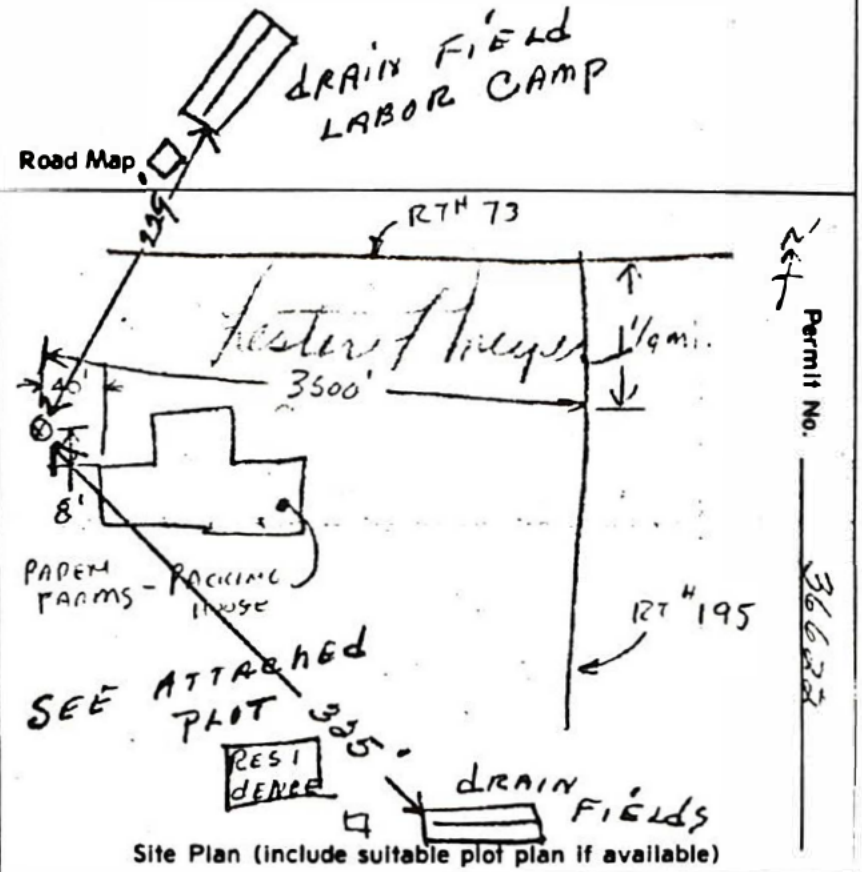
PROPOSED WELL CONSTRUCTION
Method of drilling: ROTARY
Approximate total depth of well: 100 ft.
Name of aquifer: ENGLONICA
Casing diameter (s) inner of outer (in.): 4"
Casing Material: PVC
Screen Material: PVC
Tentative Screen Setting: between 75 and 100 ft.
Estimated length of screen: 25 ft.
Will the well be gravel packed? (yes) - no
Type of grout: Cement From: 0 ft. to 20 ft.
Desired capacity of the well: 30-90 gpm
Maximum daily use: 50000 gpd

I hereby affirm the information I have furnished is accurate and correct
[signature] Applicant (circle) Representative

LOCATION MAPS

(SEE BELOW)

Road Map



Site Plan (include suitable plot plan if available)

For Official Use Only. -- Do Not Write Below This Line.

Pursuant to provisions of 7 Delaware Code, Chapter 60, permission is hereby granted to construct and use a well as described above. All current regulations governing well construction and water resource use must be followed. The following conditions must be observed: (

This permit expires: 7/20/77

SIGNED: John T Egan

A completion report must be filed with the Division of Environmental Control within twenty-one (21) days after completion of this well. Failure to do so may result in license suspension.

Permit Number: 36622
Report filed

(RED)

Delmarva Drilling Co., Inc.

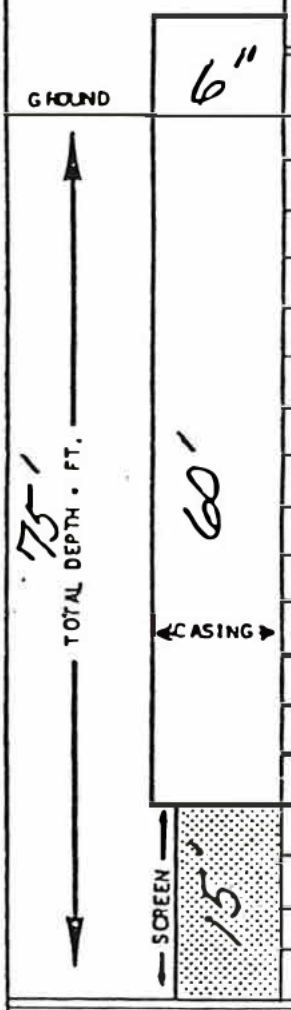
P. O. BOX 188 • BRIDGEVILLE, DELAWARE 19933

Water Well Contractors

CUSTOMER Papen Farms, Inc. JOB 3401

ADDRESS Dover, Del. DATE 8/12/76

LOCATION 30 ft. from pond Permit #36622



FEET FROM GROUND SURFACE 0 TO.....	WELL LOG
0-1	top soil
1-6	fine sand clay
6-32	~~fin~~ fine med. sand
32-34	fine sand iron ore
34-58	clay gravel
58-76	coarse sand
76-110	fine sand clay gravel

WELL NO. 1	DIAMETER OF WELL 4"	DEPT. OF WELL 75'
HRS. PUMPED 2 1/2 hrs.	SLOT SIZE .020,	TYPE OF CASING PVC
CAPACITY G.P.M. 40	DRILLING MACHINE NO. D-2	LENGTH OF CASING 60
STATIC LEVEL 9	DRILLER (b) (4)	DISTANCE TO TOP OF SCREEN
PUMPING LEVEL 18	GRAVEL 1 & 2	TYPE SCREEN PVC
SPECIFIC CAPACITY 4	BAGS OF CEMENT clay 2	SIZE OF SCREEN 4"
PUMPED WITH air pumper	DATE WELL COMPLETED 8/12/76	
DEPTH OF CEMENT GROUT clay 0-15	DRILLER'S HELPER M(b) (4)	Allen White
DEPTH GRAVEL PACKED 100-55		WELL DRILLER SIGN

(2)

ORIGINAL (RED)

Press Hard - Write Clearly - Use Ball-Point Pen or Typewriter - Press Hard

Mail To:
Water Supply Section
Division of Environmental Control
Tatnall Building
Dover, Delaware 19901

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

APPLICATION FOR A PERMIT TO DRILL A WELL

To be completed by a licensed water well driller)

APPLICATION MUST BE SUBMITTED AND PERMIT RECEIVED BEFORE DRILLING IS STARTED.

Owner: O'Town Building Co Inc
Telephone Number: 697-2131
Mailing Address: Rt #6 Box 300
Dover De 19901 zip

Date of Application: ___ Mon. ___ Day ___ Year
Estimated Date of Construction: ___
Driller: ___ License No. ___
Pump Installer: ___ License No. ___

WELL INFORMATION (circle one)

Purpose: Test Well - Permanent Well - Option to convert
Use: Domestic - Public - Commercial
Industrial - Agriculture - Other
Describe Other: ___

Is this a replacement well? yes no
Reason for replacement: ___
Date abandoned well is to be sealed: ___
How ___
Has an application been made for an approved sewage disposal system? yes - no
Permit Number: ___

LOCATION MAPS

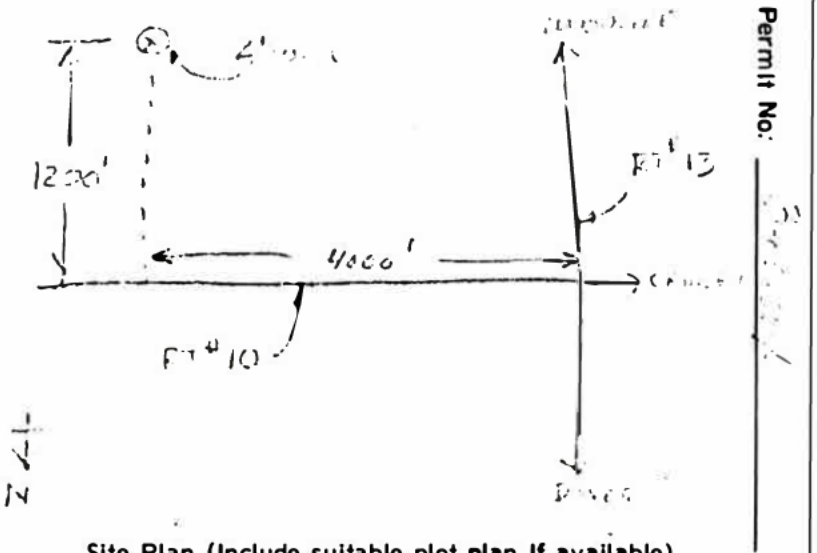
(Road Map)

Road Map

PROPOSED WELL CONSTRUCTION

Method of drilling: ___
Approximate total depth of well: 225 ft.
Name of aquifer: ___
Casing diameter (s) inner ot outer (In.) [ ] [ ] [ ]
Casing Material: PVC
Screen Material: PVC
Tentative Screen Setting: between 200 and 225 ft.
Estimated length of screen: 25 ft.
Will the well be gravel packed? yes - no
Type of grout: ___ From: ___ ft. to ___ ft.
Desired capacity of the well: 500 gpm
Maximum daily use: ___ gpd

(Property Plan)



Site Plan (Include suitable plot plan if available)

I hereby affirm the information I have furnished is accurate and correct.

___ Applicant (circle) Representative

For Official Use Only. -- Do Not Write Below This Line.

Pursuant to provisions of 7 Delaware Code, Chapter 60, permission is hereby granted to construct and use a well as described above. All current regulations governing well construction and water resource use must be followed. The following conditions must be observed: ( )

This permit expires: 5/20/76

SIGNED: ___

A completion report must be filed with the Division of Environmental Control within twenty-one (21) days after completion of this well. Failure to do so may result in license suspension.

Permit Number: ___
Report filed 11/3/75

Delmarva Drilling Co., Inc.

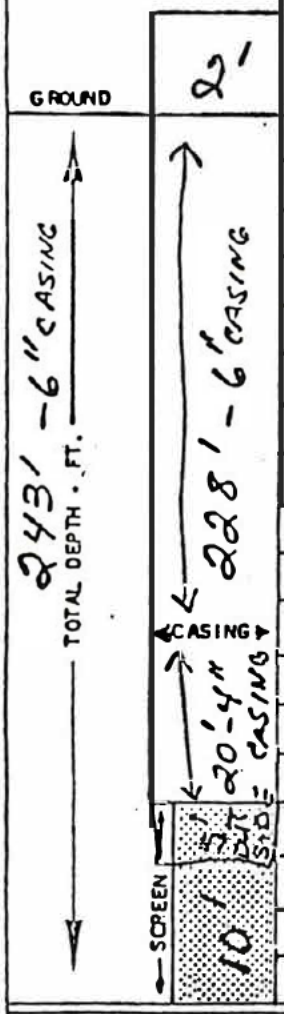
P. O. BOX 188 • BRIDGEVILLE, DELAWARE 19933

Water Well Contractors

CUSTOMER Ottawa Building Company Re drill JOB 2897

ADDRESS Dover, Delaware DATE 10/11/75

LOCATION 1200' S. off of Rt. 10 #3462



FEET FROM GROUND SURFACE 0 TO.....	WELL LOG
0-1	top soil
1-13	brown clay w/fine sand
13-27	fine to coarse tan sand
27-49	fine to coarse sand
49-51	iron ore
51-65	brown clay
65-73	fine to med. gray sand
73-171	brown clay
171-183	hard shell
183-227	blue clay w/fine sand w/shell
227-250	fine to coarse gray sand
250-260	brown clay
	Lead packer at 213 ft. 3"

WELL NO. 2R	DIAMETER OF WELL 6"	DEPT. OF WELL 243'
HRS. PUMPED 4	SLOT SIZE .016	TYPE OF CASING steel
CAPACITY G.P.M. 60 GPM	DRILLING MACHINE NO. D-3	LENGTH OF CASING 228 ft.
STATIC LEVEL 87'2 1/2"	DRILLER Ed Kelley	DISTANCE TO TOP OF SCREEN 233-2
PUMPING LEVEL 150'	GRAVEL 2 & 3	TYPE SCREEN S.S.
SPECIFIC CAPACITY 2	NAME OF PERMIT HOLDER [illegible]	SIZE OF SCREEN 6"
STATIC WELL [illegible]	WELL PERMIT NUMBER [illegible]	
DEPTH OF CEMENT GROUT 0-200	DRILLER'S HELPER H. Crowell	
DEPTH GRAVEL PACKED 200-242		Ed Kelley WELL DRILLER'S SIGNATURE

TELEPHONE 302/337-8254

ORIGINAL (RED)

Delmarva Drilling Co., Inc.

P. O. BOX 188 • BRIDGEVILLE, DELAWARE 19933

OCT 1975

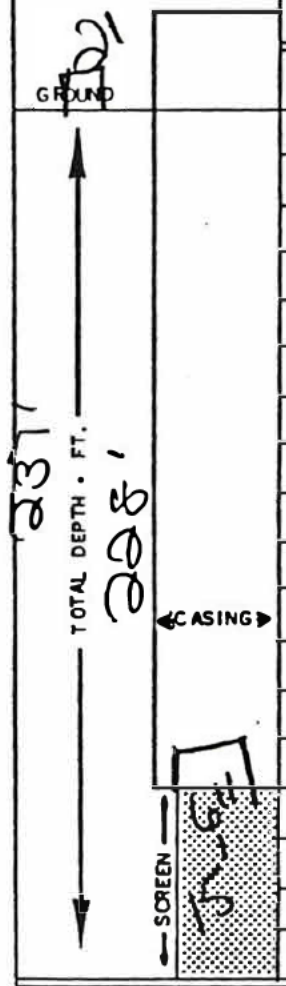
WATER RESOURCES SECTION

Water Well Contractors

CUSTOMER Ottawa Building Company JOB 2897

ADDRESS Royal Dev. Dover, DE DATE 9/18/75

LOCATION 1200' S off of Rt 10 Permit 34624



FEET FROM GROUND SURFACE 0 TO.....	WELL LOG
0-1	Top soil
1-13	Brown clay w/fine sand
13-27	Fine to course brown sand w/iron ore
27-49	Fine to course tan sand
49-51	Iron ore
51-65	Brown clay
65-73	Fine to medium gray sand
73-171	Brown clay
171-183	Hard shell
183-227	Blue clay w/fine sand w/shell
227-241	Fine to course gray sand
	Lead packer at 225'

WELL NO. 1	DIAMETER OF WELL 6	DEPT. OF WELL 237'
HRS. PUMPED 4	SLOT SIZE .016	TYPE OF CASING steel
CAPACITY G.P.M. 25	DRILLING MACHINE NO. D1	LENGTH OF CASING 230'
STATIC LEVEL 37	DRILLER Ed Kelly	DISTANCE TO TOP OF SCREEN 228-7
PUMPING LEVEL 160	GRAVEL 2&3	TYPE SCREEN S S
SPECIFIC CAPACITY	BAGS OF CEMENT	SIZE OF SCREEN 6"
PUMPED WITH air	DATE WELL COMPLETED	
DEPTH OF CEMENT GROUT 200-237'	DRILLER'S HELPER (b) (4)	(b) (4)
DEPTH GRAVEL PACKED 200-237		WELL DRILLER SIGNATURE

(3)

TELEPHONE 302/337-8254

Delmarva Drilling Co., Inc.

P. O. BOX 188 BRIDGEVILLE, DELAWARE 19933

ORIGINAL (RED)

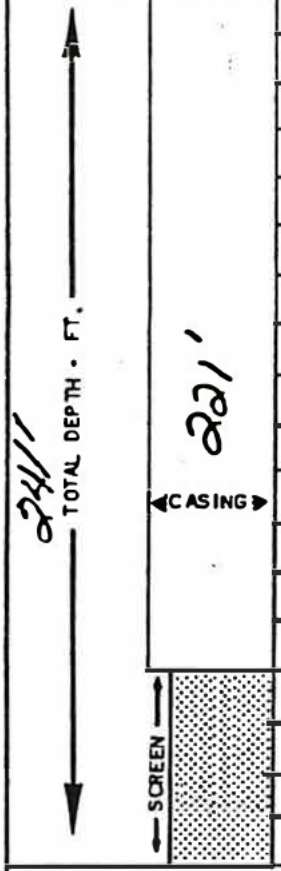
De Permit # 38796

Water Well Contractors

CUSTOMER Ottawa Builders/Tidewater Utilities JOB 4159

ADDRESS Dover, De. DATE 10-25-77

LOCATION 50' S. of Rt. 10 and 55' N. of office



FEET FROM GROUND SURFACE 0 TO.....	WELL LOG
0 - 1	top soil
1 - 12	fine to med. brown sand
12 - 27	fine to coarse tan sand
27 - 51	fine to coarse brown sand
51 - 52	iron ore
52 - 59	blue clay
59 - 94	fine to coarse gray sand
94 - 111	brown clay
111 - 121	brown clay w/fine gray sand w/shell
121 - 151	fine to med. gray sand w/shell
151 - 167	blue clay w/fine sand w/shell
167 - 170	hard layer
170 - 218	blue clay w/fine sand w/shell
218 - 245	med. to coarse gray sand
245 - 251	fine to coarse gray sand w/clay laye
251 - 268	clay w/fine sand

WELL NO. 2	DIAMETER OF WELL 8"	DEPT. OF WELL 241'
HRS. PUMPED 24	SLOT SIZE .020	TYPE OF CASING steel
CAPACITY G.P.M. 200	DRILLING MACHINE NO. D1	LENGTH OF CASING 221'
STATIC LEVEL 97'	DRILLER (b) (4) [redacted]	DISTANCE TO TOP OF SCREEN 231-2
PUMPING LEVEL 141'	GRAVEL 2 & 3	TYPE SCREEN SS
SPECIFIC CAPACITY 6.8	BAGS OF CEMENT 35	SIZE OF SCREEN 8"
PUMPED WITH turbine	DATE WELL COMPLETED 10-31-77	
DEPTH OF CEMENT GROUT 0-200	DRILLER'S HELPER (b) ( ) [redacted]	[redacted]
DEPTH GRAVEL PACKED 200-240		

(4)

9-185
(October 1950)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

10077

WELL SCHEDULE

Date ...., 19...... Field No. Jd 43-2

Record by I.W. Herine Office No. 3423

Source of data Shannahan log

1. *Location:* State Delaware County Kent
Map well in garden
...... ¼ ...... ¼ sec. ...... T. ...... N S R ...... E W

2. *Owner:* Camden & Wyoming water commission Address Wyoming
Tenant .... Address ....
Driller Shannahan Address St. Michaels Md.

3. *Topography* Coastal Plain

4. *Elevation* 44 ft. above below

5. *Type:* Dug, drilled, driven, bored, jetted Oct 1952

6. *Depth:* Rept. 236' 9" ft. Meas. ...... ft.

7. *Casing:* Diam 16X10" in., to ...... in., Type ......
Depth 16 to 101, 10 to 216 ft., Finish 21'7" #80 strainer

8. *Chief Aquifer* .... From ...... ft. to ...... ft.
Others ....

9. *Water level* 29' 6" ft. rept. meas. Oct 1952 above below
RWL 93' which is ...... ft. above below surface

10. *Pump:* Type turb. Capacity 400 G. M.
Power: Kind electric Horsepower ....

11. *Yield:* Flow ...... G. M., Pump ...... G. M., Meas., Rept. Est.
Drawdown 63'6" ft. after 12 hours pumping 500 G. M.

12. *Use:* Dom., Stock, (PS), RR., Ind., Irr., Obs.
Adequacy, permanence ....

13. *Quality* .... Temp ...... °F.
Taste, odor, color clear Sample Yes No
Unfit for ....

14. *Remarks:* (Log, Analyses, etc.)
Pump averages about 9 hrs per day
259,500 gpd av. use

U. S. GOVERNMENT PRINTING OFFICE 16-62801-1

0–30 brown sand and gravel
30–50 light brown sand and gravel
50–80 gray clay
80–90 sand with clay streaks
90–197 gray clay and shell
179 rock
197–209 fine gray sand
209–213 fine sandy clay
213–217 coarse gray sand, some clay streaks
217–238 same
238–250 brown clay

Jd43-2

Jd 43-05 1007

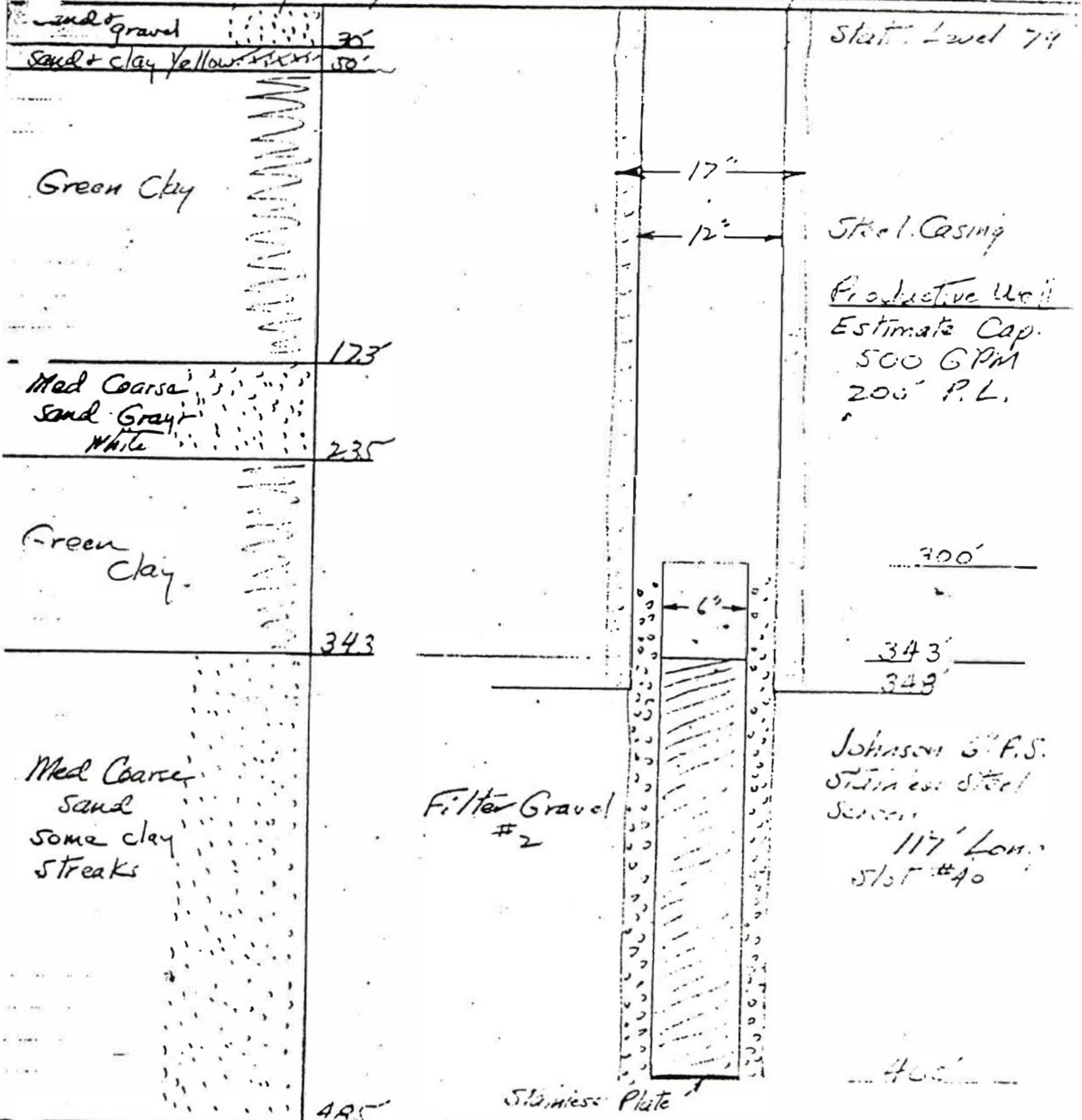
Log of
Jd 43005

Construction -
Proposed only

5-23-69
ORIGINAL
(RED)

5

Camden-Wyoming Sewer & Water Authority - Delaware



SHANNAHAN ARTESIAN WELL CO., INC.
P. O. BOX 217
ST. MICHAELS, MARYLAND

(6) Jd42-2

~~Jd-7~~

ORIGINAL (RED)

Jd 42-2

Wyoming Ice Company
Wyoming, Del.

April 12, 1946

299 ft. 6" casing
2 - 5 ft. 4½" 25 slot Johnson
47 ft. 4" black steel pipe
1 4" plug
1 4" coupling threaded on outside

Total length of screen 59'2"

MIOCENE →	25	0-25		clay and sand
	35	25-60		clay
	30	60-90 ←		gray sand
	39	90-129		black clay ?
	43	129-172		sand, shell and clay
	1	172-173		hard pan
	33	173-206		sand shell blue clay
EOCENE →	13	206-219	△	sand and shell
CRETA. →	116	219-335	—	black clay
	12	335-347	+	green and black sand

Well 347 ft. deep

wrong interpretation ↑

278 from top of casing to top of packer

Water level 26 ft.

290 ft. air line 60 gal 22 sec 163.5
210 ft. air line 60 gal 32 sec 112.5
167 ft. air line 60 gal 38 sec 94.7
147 ft. air line 60 gal 40 sec 90.0

$\frac{60}{22} \times 60 = 164$ 3600

(1)

Press Hard - Write Clearly - Use Ball-Point Pen or Typewriter - Press Hard

ORIGINAL (RED)

Mail To:
Water Supply Section
Division of Environmental Control
Tatnall Building
Dover, Delaware 19901

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
APPLICATION FOR A PERMIT TO DRILL A WELL
To be completed by a licensed water well driller)

APPLICATION MUST BE SUBMITTED AND PERMIT RECEIVED BEFORE DRILLING IS STARTED.

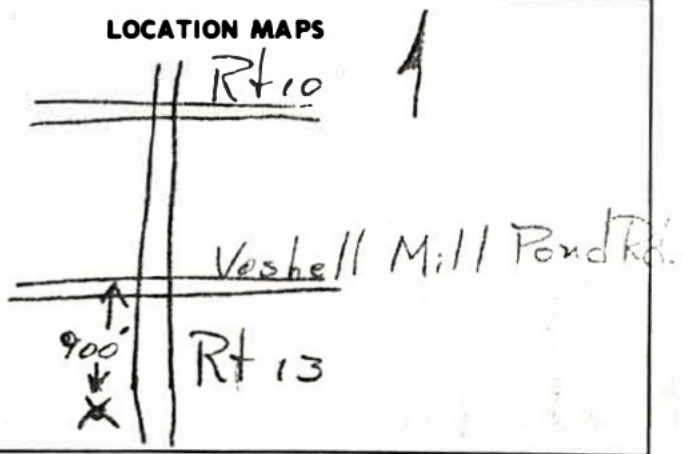
Owner: Tidewater Utilities
Telephone Number: 215-644-0650
Mailing Address: Box 365
Paoli, Pa. 19301 zip

Date of Application: 4 Mon. 1 Day 25 Year
Estimated Date of Construction: 5-30-75
Driller: Paul White License No. 1
Pump Installer: J. F. Alexander License No.

WELL INFORMATION (circle one)

Purpose: Test Well - Permanent Well - Option to convert
Use: Domestic - (Public) Commercial
Industrial - Agriculture - Other
Describe Other:
Is this a replacement well? (yes) no
Reason for replacement:
Date abandoned well is to be sealed:
How
Has an application been made for an approved sewage disposal system? yes - no
Permit Number:

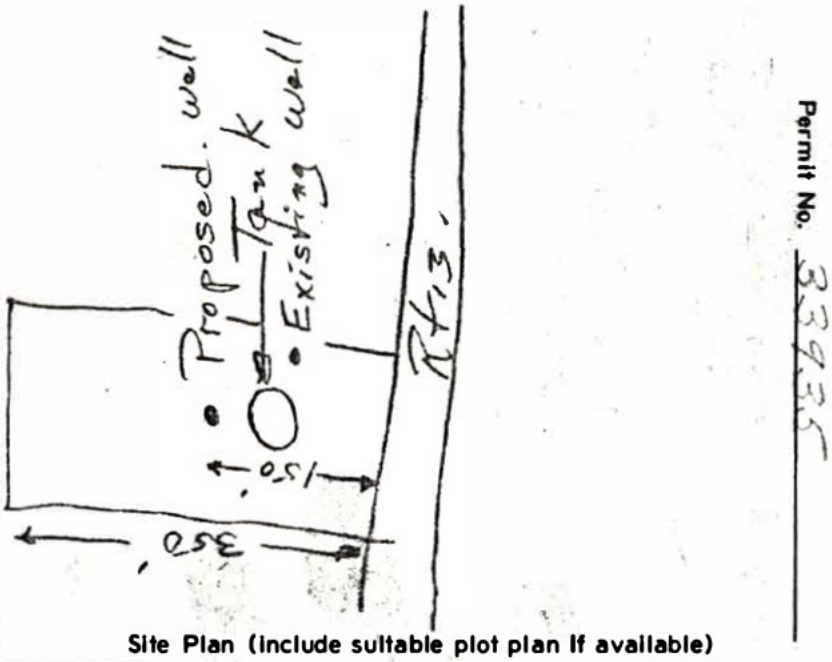
LOCATION MAPS



Road Map

PROPOSED WELL CONSTRUCTION

Method of drilling: Rotary
Approximate total depth of well: ± 250 ft.
Name of aquifer: Cheswold
Casing diameter (s) inner ot outer (in.): 8"
Casing Material: Steel
Screen Material: SS
Tentative Screen Setting: between 230 and 250 ft.
Estimated length of screen: 20' ft.
Will the well be gravel packed? (yes) no
Type of grout: Cement From: 0 ft. to 230 ft.
Desired capacity of the well: 250 gpm
Maximum daily use: 250,000 gpd



Site Plan (include suitable plot plan if available)

I hereby affirm the information I have furnished is accurate and correct
J. F. Alexander Applicant (circle) Representative

For Official Use Only. -- Do Not Write Below This Line.

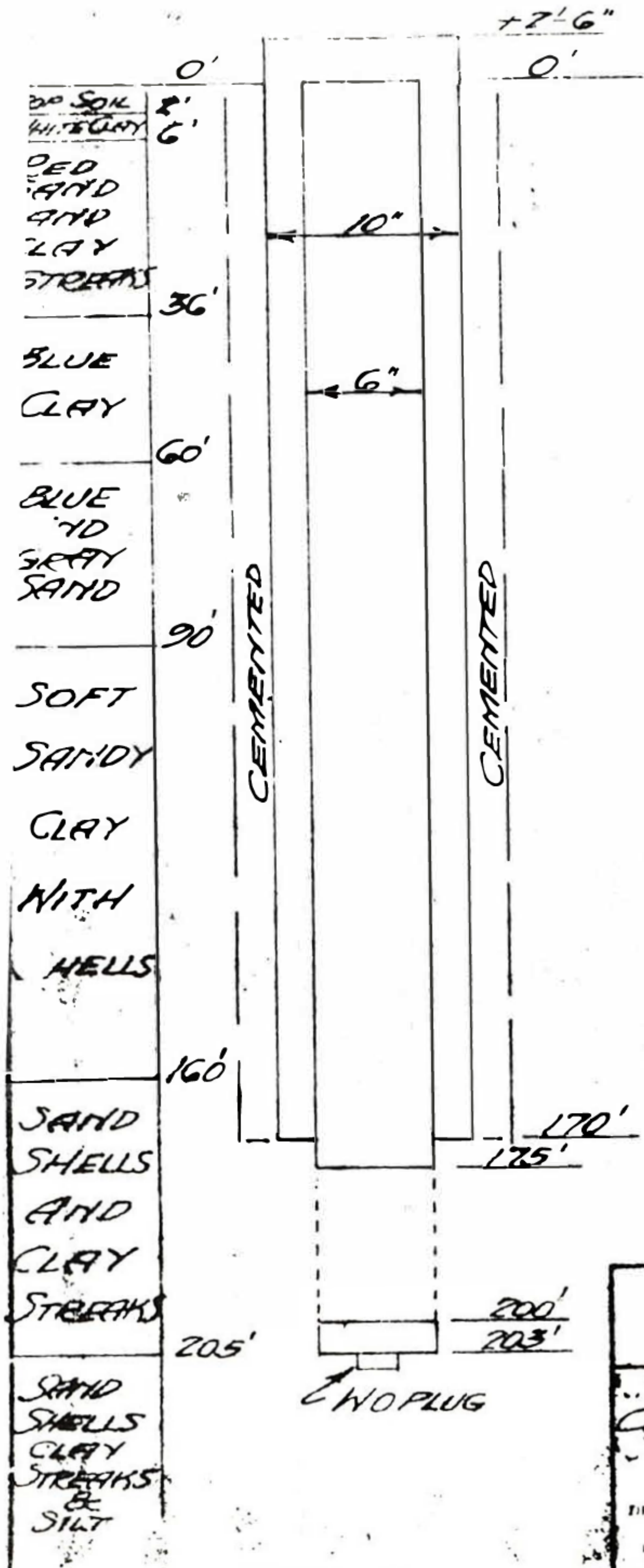
Pursuant to provisions of 7 Delaware Code, Chapter 60, permission is hereby granted to construct and use a well as described above. All current regulations governing well construction and water resource use must be followed. The following conditions must be observed: (attached)

This permit expires: August 8, 1976

SIGNED: N.C. Vasu

A completion report must be filed with the Division of Environmental Control within twenty-one (21) days after completion of this well. Failure to do so may result in license suspension.

Permit Number: 3394
Report filed



Material *Applicant ...*

Pit: 172'-6" OF 10" STEEL PIPE T.C.
175' OF 6" STEEL PIPE T.C.

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Screen: 25' OF 6" STAINLESS STEEL

Cone: WASH-OUT PLUG, CEMENTED

Pump

Type	DRMC	Shop No.	28994-A
Setting	173'-7"	Size	6"
Suction	10' OF 4"	Stages	6
Basket	F.V.	Impellers	BRONZE
Discharge	4" x 10' T.C.	Head	7F418
Tubing	1¼"	Press B. P.	50#
Shafting	7/8"	Air Line	183'

Motor

Make	U.S.	Type	HOLLOW SHAFT
Volts	220/440	Cycle	60
Phase	3	Amp.	25-50
H. P.	20	R. P. M.	3600
Frame	326-P	Form	VERT.
Model	CFU	Serial	2377795

Well

Started	7-20-54	Static Level	32'
First Test	9-15-54	Production	151 / 183
Final Test	9-30-54	Pumping Level	153' / 150
Accepted	9-30-54	Guarantee	150
Clear Depth	210' B.P.	Press.	62#

Driller: (b) (4) [redacted]
Installer

LAYNE-NEW YORK CO. INC. NEW YORK, N.Y.
WATER SUPPLY CONTRACTORS

CAMDEN DOWER HOUSING CORP.
CAMDEN, DEL.

DRAWN BY RFO | APPROVED BY
LAYNE WELL NO. 1 | DWG. NO.

water analyses

Booth, Garrett & Blair, Inc.
180 SOUTH MAIN ST., P.O. Box 58
AMBLER, PENNA. 19002
(215) 646-8320

ORIGINAL (RED)

July 8, 1969

Penna. State Approved Lab. No. VII-24

FOR Camden-Wyoming Sewer and Water Authority
P. O. Box 156
Camden-Wyoming, Delaware 19934

SAMPLE MARKED — TEST WELL

SAMPLE RECEIVED — July 7, 1969

JJ43-5 10078

Total Solids on evaporation, PPM	✓	362.	TDS
Carbonate Hardness, PPM	✓	64.	HD
Non-Carbonate Hardness, PPM	✓	0.	NCH
Total Hardness, PPM	✓	64.	HDT
Calcium Hardness, PPM	✓	32.	HDC
Chlorine (Chloride), PPM	✓	4.	Cl
Alkalinity — M.O., PPM	✓	299.	ALK
Free Carbonic Acid (CO_2), PPM		0.	
Iron, PPM	✓	0.01	FET
Manganese, PPM	✓	0.03	MN
Nitrate Nitrogen as N, PPM	✓	0.04	N3
A.B.S., PPM		0.00	
Turbidity	✓	0.	TU
pH	✓	8.3	PH
Sulfate (SO_4) PPM	✓	2.	SO4
Fluoride PPM	✓	0.5	F

REMARKS

Yours respectfully,

BOOTH, GARRETT & BLAIR, INC.

(b) (4) [redacted]

ORIGINAL
(RED)

GROUND-WATER MONITORING AND RECOVERY PROGRAM CAMDEL METALS CAMDEN, DELAWARE

November 1986

Prepared by:

(b) (4) [redacted]
Soil Scientist

(b) (4) [redacted], Ph.D.
President
Reg. #. 110

SMC MARTIN INC.
900 W. Valley Forge Road
P. O. Box 859
Valley Forge, PA 19482

Ref: 8713-94003

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LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

This report presents the findings of the ground-water monitoring program specified by the Department of Natural Resources and Environmental Control (DNREC) in their letter of April 11, 1984. In addition, data concerning the ground-water recovery program currently being conducted in response to a spill of trichloroethylene (TCE) are also presented. This report details the data collected from April 1984 through July 1986.

2.0 BACKGROUND

A spill of TCE at Camdel Metals was reported to DNREC on October 15, 1984. A more detailed description of the incident is provided in our letter to DNREC of November 2, 1984. Prior to this spill, Camdel Metals was engaged in a long-term ground-water monitoring effort that included the submittal of an annual report to DNREC containing the following data:

- Quarterly ground-water sampling data from Monitor Well Nos. 4, 7, and 17 with water table elevations from all wells.
- Annual sampling of Monitor Well Nos. 14, 15, and 16.

The ground-water samples are analyzed for the following parameters:

- 1,1,1-trichloroethene
- Trichlorothylene (TCE)
- Tetrachloroethylene
- Chloroform

Remedial measures conducted in response to the previously-referenced spill are outlined below:

1. Excavation of the contaminated soils and backfilling with clean soil.
2. Installation of a recovery well in the spill area (RW-1).
3. On-site treatment of the excavated soils by Soil Shredding (report to DNREC, February 1, 1985).

4. Installation of a monitoring well adjacent and downgradient of the discharge aeration for Recovery Well One (RW-1).
5. Regrouting of Monitor Well No. 6 in the spill area.
6. Construction of a berm in the spill area to contain TCE within the building.

Notification or documentation of the above remedial activities were provided to DNREC in previous submittals.

Ground-water recovery operations began on April 18, 1984, when the recovery well installed in the spill area (RW-1) began pumping at a rate of approximately 50 gallons per minute (gpm).

3.0 GROUND-WATER MONITORING PROGRAM

The ground-water monitoring program at Camdel Metals is divided into three separate areas in order to provide a more complete presentation of the data collected. These three areas are: 1) annual ground-water monitoring data; 2) quarterly ground-water monitoring data; and 3) ground-water recovery data. The analytical results and hydrogeologic data for these three areas will be discussed in subsequent sections.

3.1 Monitoring Network

The ground-water monitoring network at Camdel Metals consists of fourteen wells. The locations of the wells are shown on Figure 3-1. The construction details and surface elevations for each of the wells are displayed in Table 3-1. Two of these wells, RW-1 and RW-2, are used as ground-water recovery wells. Both recovery wells are equipped with flow meters to monitor both the rate and volume of water discharged.

3.2 Sampling Frequencies

In addition to the annual and quarterly sampling frequencies detailed earlier, samples have been collected on a monthly basis since July 1986 from recovery wells RW-1 and RW-2; Monitor Well Nos. 16, 17, 18, and 19; the aerated discharge; and the stormwater retention basin. Prior to July 1986, samples of the recovery wells, stormwater retention basin, aerated discharge and Monitor Well No. 19 were collected weekly. All monitoring

FIGURE 3-1
MONITOR WELL LOCATIONS
CAMDEL METALS

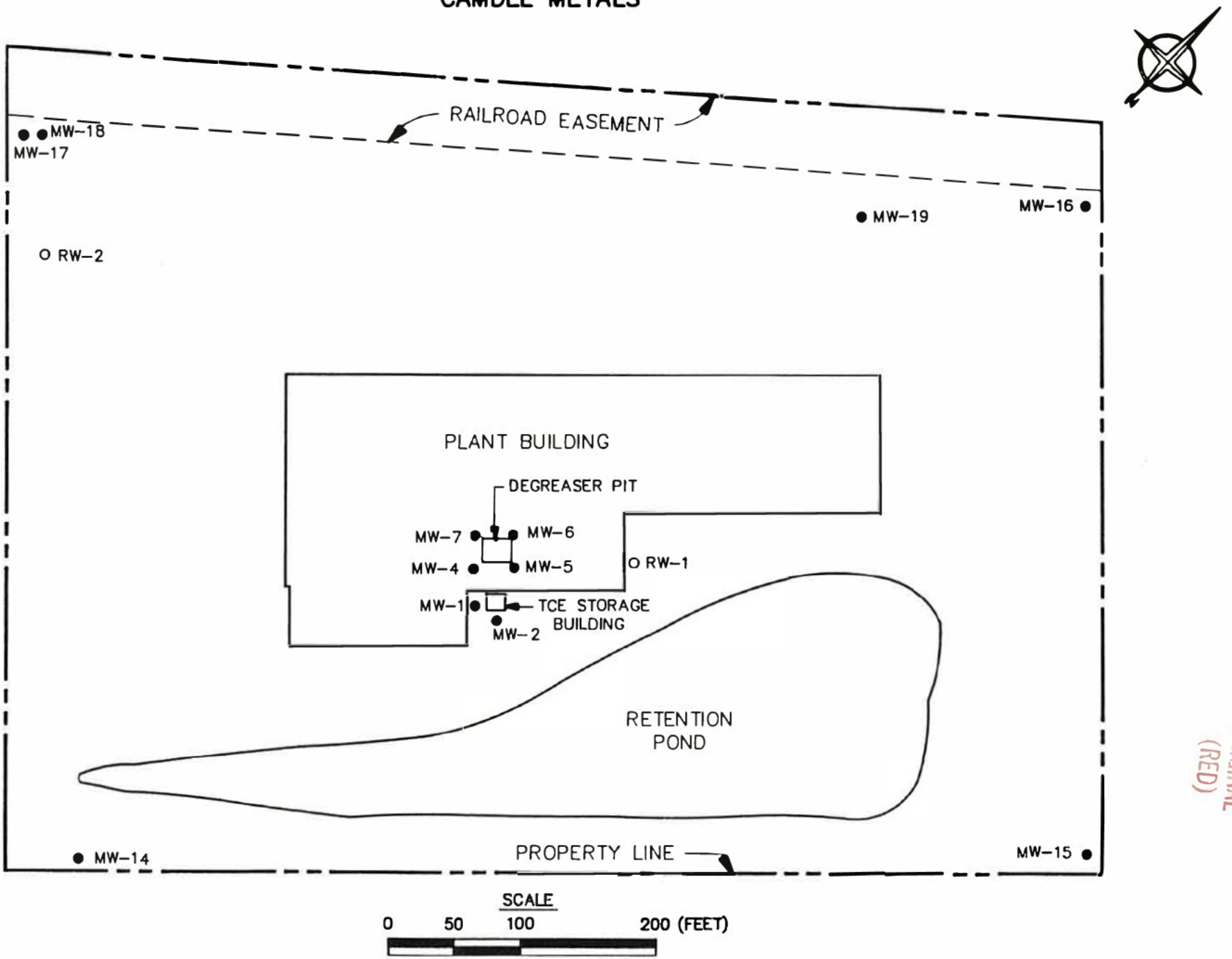

TABLE 3-1

MONITORING WELL NETWORK CONSTRUCTION DETAILS

Ground-Water Monitoring Well No.	Elevation Top of Casing (feet above MSL)	Total Depth (feet from G.S)	Screened Interval (feet from G.S)	Inside Diameter (in.) and Construction Material
RW-1	51.45	55.0	40-55	6"-PVC
RW-2	51.60	58.0	43-58	6"-PVC
MW-1	50.61	15.0	10-15	2"-Steel
MW-2	50.60	15.0	10-15	2"-Steel
MW-4	50.32	15.0	10-15	2"-Steel
MW-5	50.30	15.0	10-15	2"-Steel
MW-6	50.53	15.0	10-15	2"-Steel
MW-7	50.20	15.0	10-15	2"-Steel
MW-14	49.29	20.0	15-20	2"-PVC
MW-15	50.48	20.0	15-20	2"-PVC
MW-16	50.20	20.0	15-20	2"-PVC
MW-17	51.98	20.0	15-20	2"-PVC
MW-18	51.45	53.0	48-53	2"-PVC
MW-19	51.16	22.0	10-20	2"-PVC

G.S. - Ground Surface

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locations and sampling frequencies were specified or approved by DNREC prior to implementation.

3.3 Sampling Methodology

Monitor well samples at Camdel Metals are collected using a teflon bailer and dedicated rope. Prior to its use in each well, the bailer is thoroughly decontaminated with acetone, wiped down with paper towels, rinsed with deionized water and again wiped down with paper towels to remove residual organics. Three well volumes are bailed prior to sample collection. Recovery Wells RW-1 and RW-2 are equipped with sample taps that allow for sample collection directly from the discharge stream. The sample taps are opened and allowed to clear for approximately one minute prior to sample collection. The stormwater retention basin is sampled by immersing the sample container directly into the basin at a point adjacent to the spill area. Analytical results for the stormwater retention basin are displayed in Table A-4, Appendix A. The aerated discharge sample is collected by placing a pan on the ground under the heaviest portion of the discharge stream and allowed to collect a minimum of 40 ml. Approximately two minutes are required to accumulate this volume of sample in the pan prior to transferring to the sample container. All sample containers are laboratory cleaned 40 ml glass volatile organic analysis (VOA) vials with teflon septa and screw-type plastic caps. Immediately after collection, samples are placed in an iced

cooler. The samples are delivered to the laboratory for analysis the same day they are collected following strict chain-of-custody control procedures.

3.4 Annual and Quarterly Analytical Results

The annual monitoring data include samples from the perimeter Monitor Wells No. 14, 15, and 16. These data are collected in April of each year. To date, no contaminants have been detected in these wells. The quarterly monitoring data include samples from the two downgradient degreaser wells, Nos. 4 and 7, and the shallow downgradient perimeter well, No. 17. Analytical results for Monitor Wells 4, 7, and 17 are displayed in Tables 3-2, 3-3, and 3-4. Graphs of these results are shown as Figures 3-2, 3-3, and 3-4.

TABLE 3-2

QUARTERLY ANALYTICAL RESULTS
FOR MONITOR WELL NO. 4

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
04/13/84	16.0	0	0	0
07/02/84	31.0	0	0	0
10/02/84	26.0	0	0	0
01/18/85	50.0	0	0	0
04/11/85	5.3	115.0	0	0
07/12/85	13.0	0	0	0
01/31/86	86.0	3.2	0	0
07/02/86	4.5	0	0	0

8713:SEJTBJ/1

TABLE 3-3

QUARTERLY ANALYTICAL RESULTS
FOR MONITOR WELL NO. 7

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
04/13/84	6.0	0	0	0
07/02/84	18.0	0	0	0
10/02/84	21.0	0	0	0
01/18/85	10.0	0	0	0
04/11/85	14.0	0	0	0
07/12/85	83.0	0	0	0
01/31/86	120.0	0	0	.4
07/02/86	6.5	0	0	0

8713:SEJTBJ/2

TABLE 3-4

QUARTERLY ANALYTICAL RESULTS
FOR MONITOR WELL NO. 17

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
04/13/84	0	0	0	0
07/02/84	0	0	0	0
10/02/84	0	0	0	0
01/18/85	0	0	0	0
04/11/85	0	0	0	0
07/12/85	0	0	0	0
01/31/86	6.0	3.0	0	0
04/25/86	8.6	6.6	0	.4
07/02/86	0	0	0	0

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FIGURE 3-2

QUARTERLY SAMPLING RESULTS MONITOR WELL FOUR APRIL 1984 TO JULY 1986

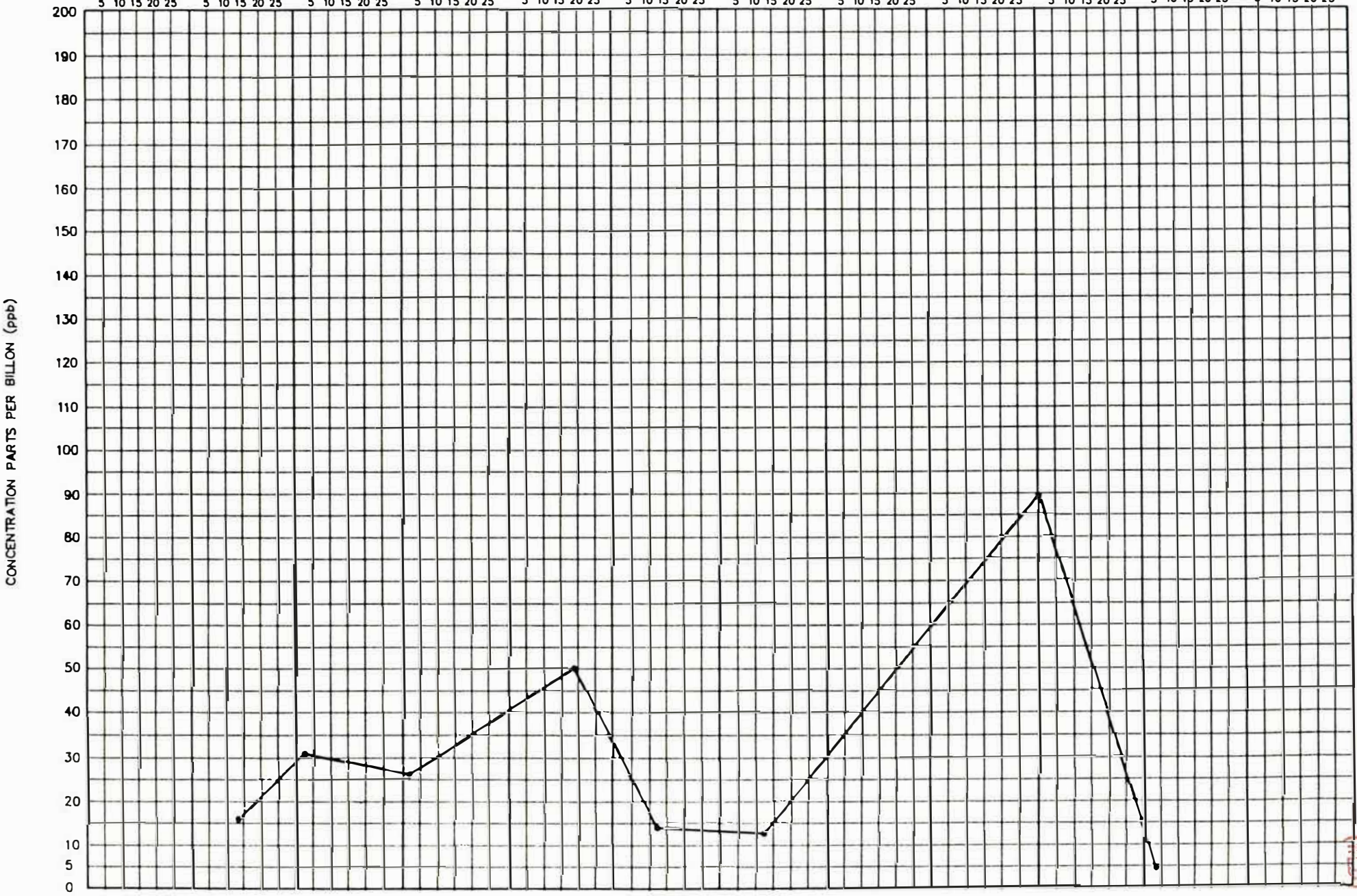


FIGURE 3-3

QUARTERLY SAMPLING RESULTS MONITOR WELL SEVEN APRIL 1984 TO JULY 1986

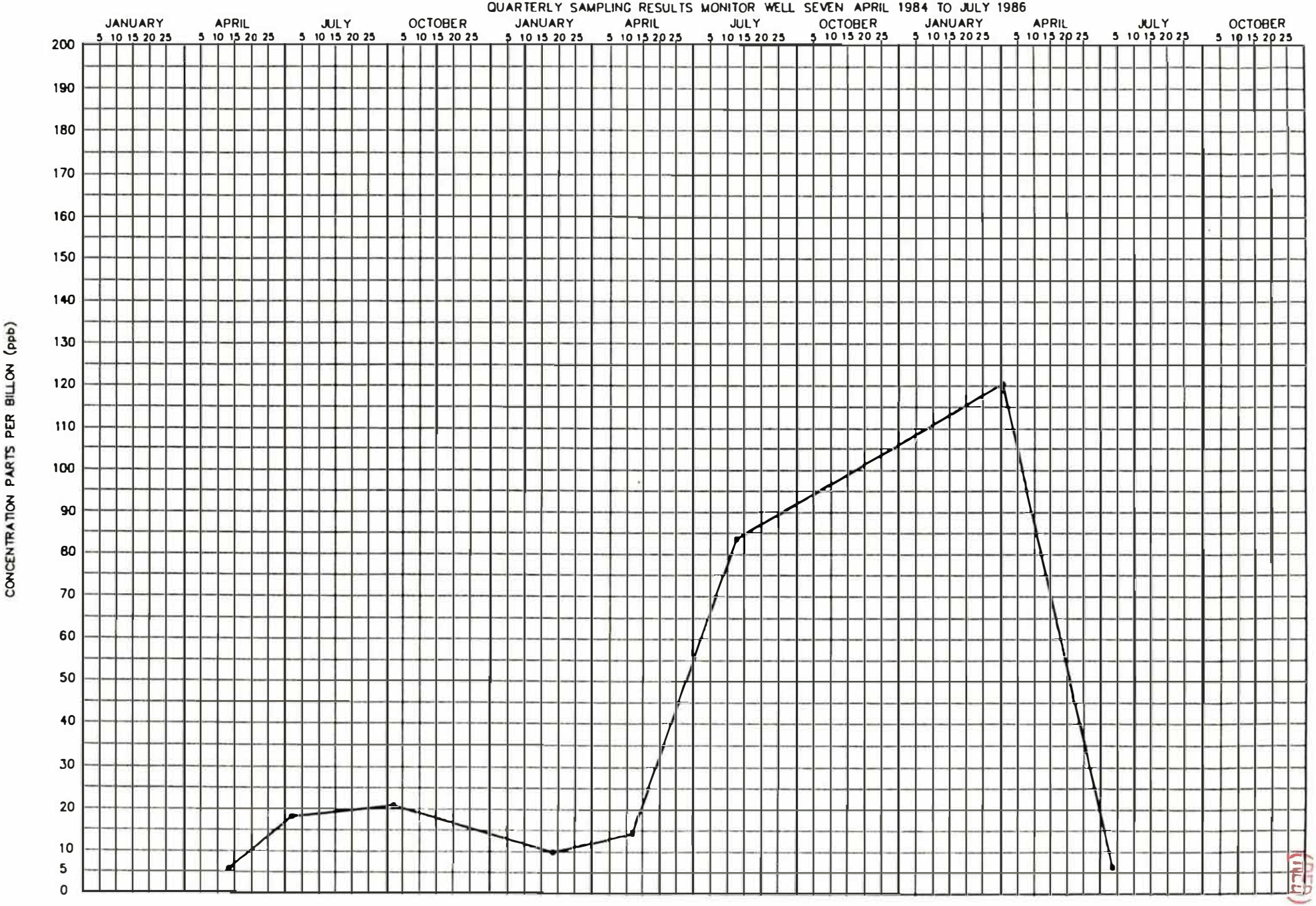
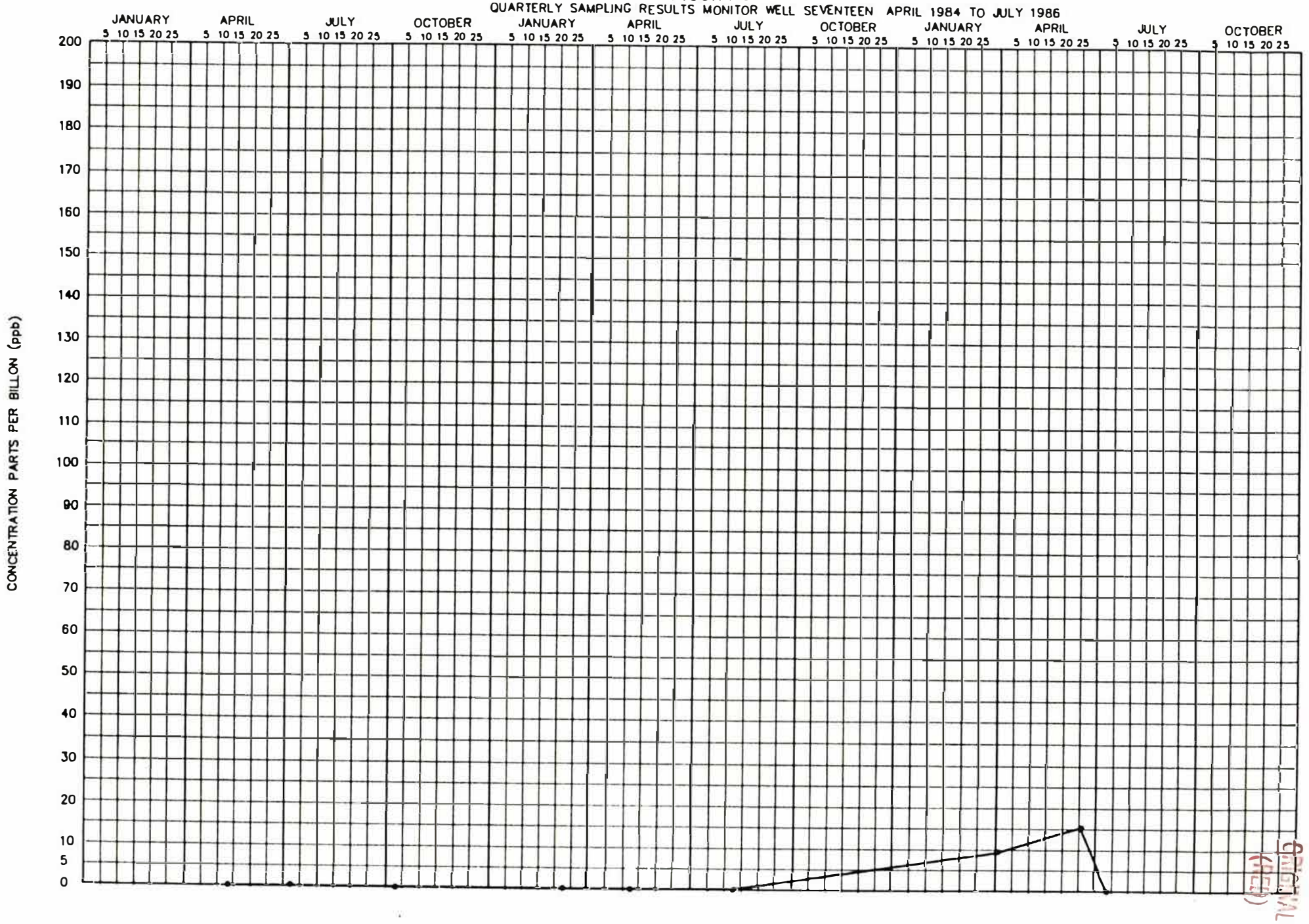


FIGURE 3-4

QUARTERLY SAMPLING RESULTS MONITOR WELL SEVENTEEN APRIL 1984 TO JULY 1986



4.0 GROUND-WATER RECOVERY PROGRAM

The on-going ground-water recovery operations began on April 18, 1984, when recovery well one (RW-1) began pumping at approximately 50 gpm. Construction details for this well are shown in Figure 4-1. This rate of ground-water removal was maintained for approximately one year. On May 7, 1986, a second recovery well (RW-2) began pumping at a rate of approximately 35 gpm. At this time, the pump rate in RW-1 was reduced to approximately 30 gpm. Construction details for RW-2 are shown in Figure 4-2. Both wells were completed to the top of the underlying clay confining unit. Cumulative ground-water removal volumes for both recovery wells in millions of gallons are displayed in Table 4-1. Recovery well two was installed in a downgradient location for the purpose of recovering contaminants that were detected in Monitor Wells 17 and 18. Based on a ground-water velocity of 150 feet per year (Investigation of TCE Contamination at Camdel Metals Corporation, SMC Martin, June 1983), it would take approximately 3.3 years for contaminants to migrate from the site of the first spill (TCE storage building) to Monitor Wells 17 and 18. The contaminants detected in Monitor Well Nos. 17 and 18 in the January 1986 sampling are likely the result of the initial contaminants detected in November 1982 near the TCE storage building and not the spill reported in October 1984.

FIGURE 4-1

MONITORING / RECOVERY WELL SPECIFICATIONS
WELL NO. RW-1

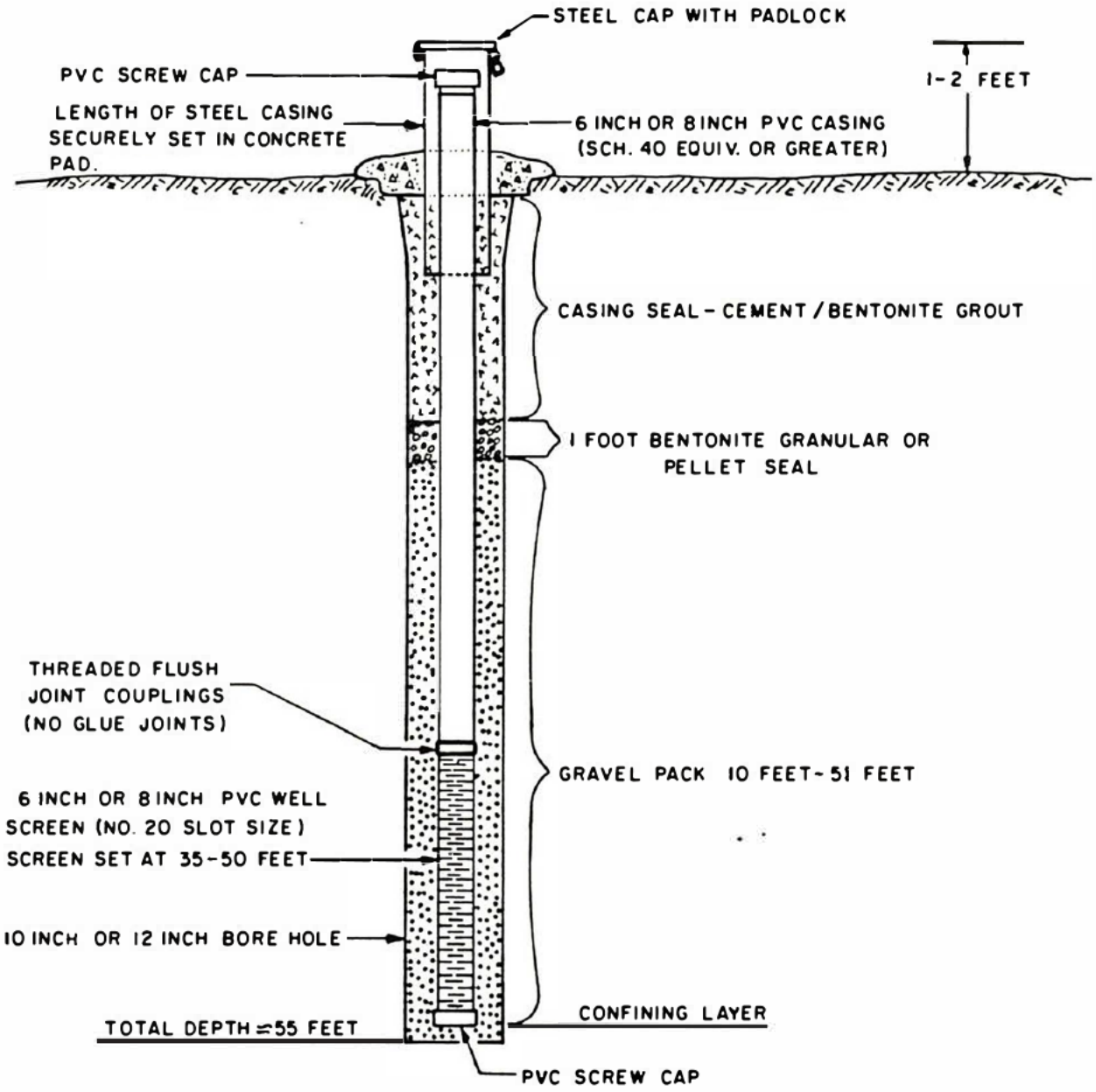


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FIGURE 4-2

MONITORING / RECOVERY WELL SPECIFICATIONS

WELL NO. RW-2

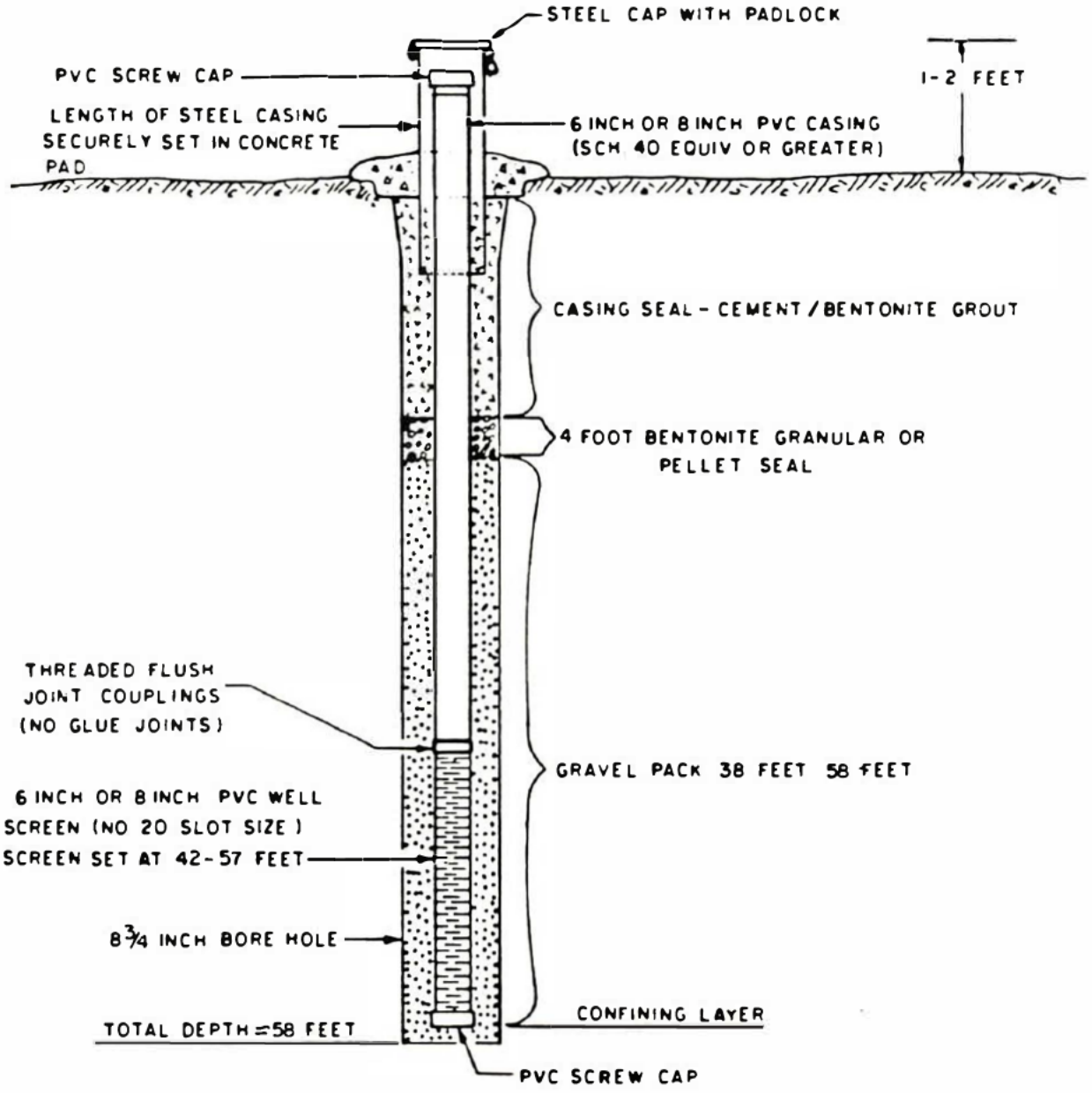

TABLE 4-1

CUMULATIVE GROUND-WATER REMOVAL
VOLUMES FOR RECOVERY WELLS RW-1 AND RW-2
FROM 05/01/85 TO 08/07/86

Well No. / Date	Cumulative Volume Pumped (10^6 gal.) RW-1	RW-2
04/19/85	.072	
04/20/85	.144	
04/21/85	.216	
04/22/85	.288	
04/23/85	.360	
04/24/85	.432	
04/25/85	.504	
04/26/85	.576	
04/27/85	.648	
04/29/85	.812	
05/01/85	.916	
05/03/85	1.02	
05/07/85	1.37	
05/10/85	1.59	
05/14/85	1.86	
05/20/85	2.30	
05/24/85	2.60	
05/28/85	2.94	
05/31/85	3.16	
06/04/85	3.50	
06/07/85	3.80	
06/11/85	4.15	
06/14/85	4.40	
06/18/85	4.70	
06/21/85	4.95	
06/25/85	5.31	
06/28/85	5.53	
07/05/85	6.10	
07/09/85	6.42	
07/12/85	6.63	
07/16/85	6.93	
07/19/85	7.22	
07/23/85	7.50	
07/26/85	7.72	
07/30/85	8.00	
08/02/85	8.22	
08/06/85	8.53	
08/09/85	8.78	
08/16/85	9.28	

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July 1986. This area was established to permit maintenance of the original aeration area without interrupting the treatment program. This area adjoins the site and is also owned by Camdel Metals.

Monitor Well No. 19 was established downgradient of the original discharge spray area, at the request of DNREC, in order to detect the presence of contaminants originating from the aerated discharge. Construction details for this well are shown in Figure 4-6. Monitor Well No. 16 is located downgradient of the second discharge aeration area.

4.2.1 Discharge Aeration Area Soil Sampling

Due to the presence of contaminants reported in Monitor Well 19 after the March 24, 1986 sampling, the soils in the discharge spray area were sampled to determine if they were the source of the contaminants reported in Monitor Well 19. Three depth discrete samples were collected at separate locations along a line laid out between Monitor Well 19 and the impulse-type sprinkler using a hand screw-type auger. The depths of sample collection were 1.5-2.0 feet, 3.5-4.0 feet, and 5.5-6.0 feet, respectively. No contaminants were detected in any of these samples or in subsequent water samples collected from Monitor Well 19.

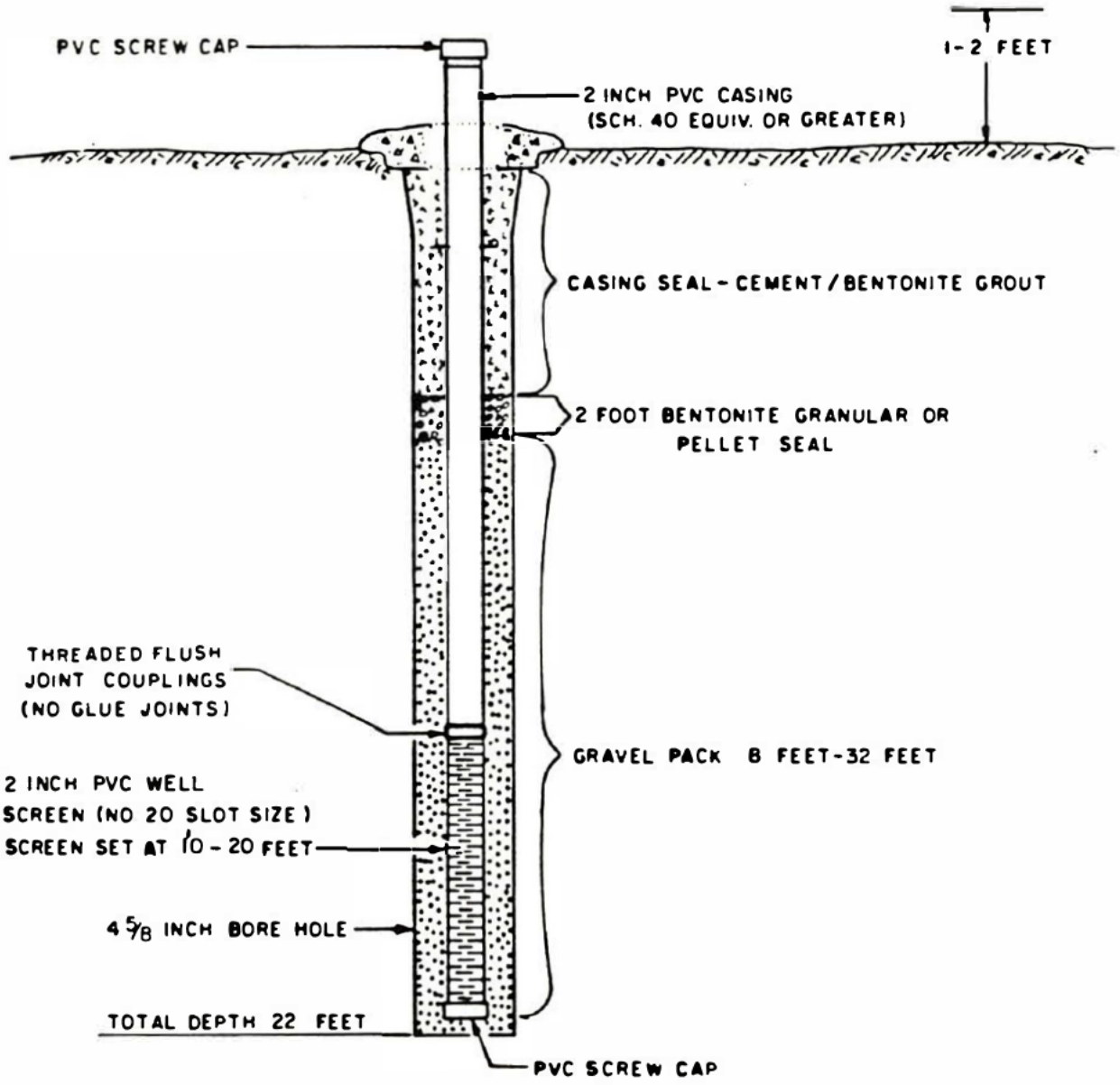
4.3 Ground-Water Recovery Analytical Results

Analytical results for recovery wells one and two are displayed in Tables A-1 and A-2 in Appendix A, respectively. Graphs showing the data listed in Tables A-1 and A-2 are

FIGURE 4-6

MONITORING / RECOVERY WELL SPECIFICATIONS

MONITOR WELL- 19



presented as Figures 4-7 and 4-8, respectively. The graphs reflect the total contaminant concentrations in each well from the time pumping began to the August 7, 1986 sampling.

FIGURE 4-7

CONTAMINANT CONCENTRATIONS OF RECOVERED GROUND WATER FROM RECOVERY WELL ONE (RW 1) OPERATING AT AN AVERAGE RATE OF 47 GPM FOR 1985

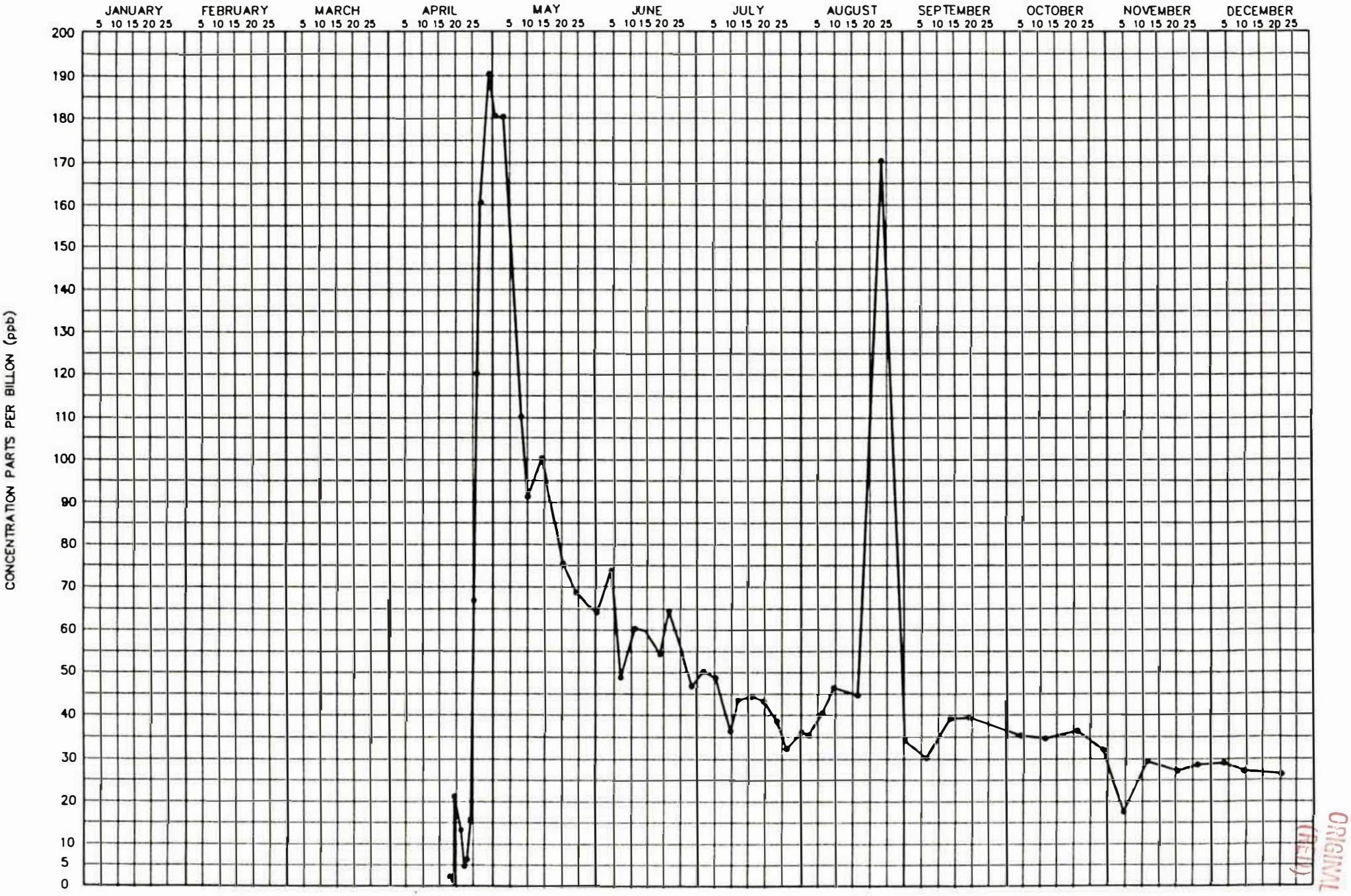


FIGURE 4-7 (Continued)

CONTAMINANT CONCENTRATIONS OF RECOVERED GROUND WATER FROM RECOVERY WELL ONE (RW-1) OPERATING AT AN AVERAGE RATE OF 47 GPM FOR 1986

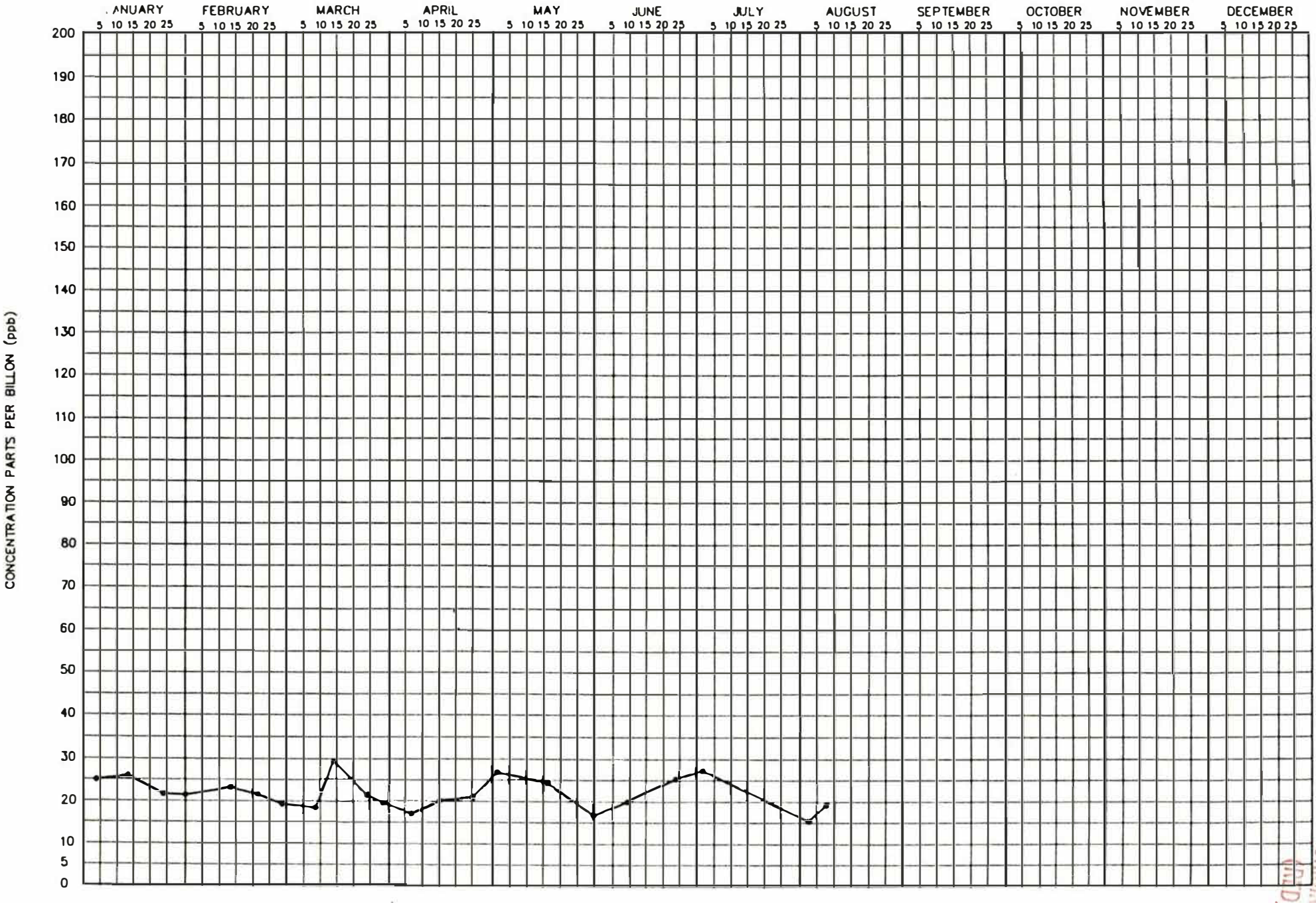
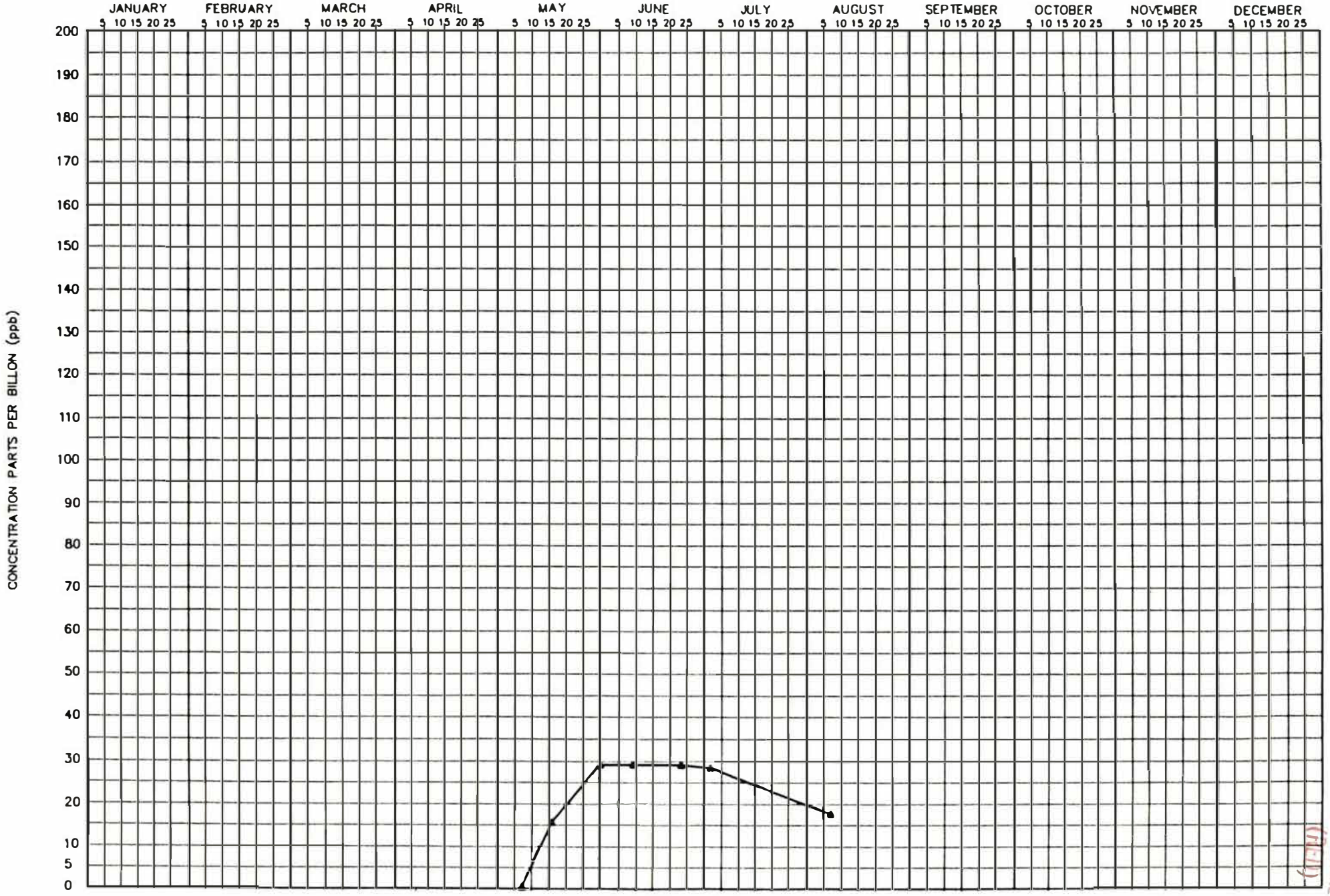


FIGURE 4-8

CONTAMINANT CONCENTRATIONS OF RECOVERED GROUND WATER FROM RECOVERY WELL TWO (RW-2) FOR 1986



5.0 CONCLUSIONS

The on-going ground-water recovery program at Camdel Metals has been successful in entraining and recovering contaminants that resulted from the October 1984 and July 1982 releases as evidenced by the data presented herein. Contaminant concentrations in both recovery wells and monitor wells have declined steadily since the onset of recovery operations. This continuing decline is further evidenced by data gathered after the August 7, 1986 cutoff point for this report. Based on the hydrogeologic and analytical data presented in this report, it is concluded that contaminants have been contained on-site because of the timely implementation of the on-going ground-water recovery program.

APPENDIX A

ANALYTICAL RESULTS
FOR
GROUND-WATER RECOVERY AND
TREATMENT PROGRAM
RECOVERY WELLS 1, 2; AERATED DISCHARGE,
STORMWATER RETENTION BASIN

TABLE A-1

ANALYTICAL RESULTS
FOR
RECOVERY WELL ONE (RW-1)

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
04/18/85	2.0	3.4	0	1.8
04/19/85	1.0	0	0	1.0
04/20/85	21.0	0	0	.8
04/21/85	13.0	0	0	.7
04/22/85	4.6	0	0	.8
04/23/85	6.7	0	0	.7
04/24/85	16.0	0	0	.7
04/25/85	67.0	0	0	.6
04/26/85	120.0	0	0	.8
04/27/85	160.0	0	0	.9
04/29/85	190.0	0	0	1.0
05/01/85	180.0	0	0	1.1
05/03/85	180.0	0	0	1.1
05/07/85	110.0	0	0	1.2
05/10/85	91.0	0	0	1.4
05/14/85	100.0	0	0	1.5
05/20/85	75.0	0	0	1.6
05/24/85	67.0	0	0	2.3
05/28/85	65.0	0	0	1.7
05/31/85	64.0	0	0	1.2
06/04/85	78.0	0	0	1.6
06/07/85	47.0	0	0	1.7
06/11/85	60.0	0	0	1.7
06/14/85	59.0	0	0	1.9
06/18/85	54.0	0	0	1.6
06/21/85	64.0	0	0	1.8

8713:SJTBARJ/1

TABLE A-1 - Continued

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
06/25/85	55.0	0	0	0
06/28/85	46.0	0	0	1.8
07/02/85	50.0	0	0	2.3
07/05/85	48.0	0	0	1.9
07/09/85	36.0	0	0	2.5
07/12/85	43.0	0	0	2.3
07/16/85	44.0	0	0	2.2
07/19/85	43.0	0	0	2.2
07/23/85	37.0	0	0	2.5
07/26/85	32.0	0	0	2.0
07/30/85	37.0	0	0	2.1
08/02/85	35.0	0	0	2.2
08/06/85	40.0	0	0	1.9
08/09/85	46.0	0	0	2.5
08/16/85	44.0	0	0	2.3
08/23/85	170.0	0	0	1.8
08/30/85	34.0	0	0	1.8
09/06/85	30.0	0	0	.3
09/13/85	39.0	0	0	2.0
09/19/85	39.0	0	0	1.8
10/04/85	35.0	0	0	1.8
10/11/85	34.0	0	0	2.2
10/21/85	37.0	0	0	1.9
10/28/85	31.0	0	0	1.6
11/04/85	17.0	0	0	1.7
11/11/85	29.0	0	0	1.8
11/20/85	27.0	0	0	2.1
11/26/85	29.0	0	0	2.1
12/03/85	28.0	0	0	2.1

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TABLE A-1 - Continued

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
12/09/85	27.0	0	0	2.0
12/20/85	26.0	0	0	1.9
01/03/86	25.0	0	0	1.7
01/13/86	26.0	0	0	.2
01/24/86	22.0	0	0	2.0
01/31/86	22.0	0	0	2.1
02/13/86	23.0	0	0	2.2
02/21/86	22.0	0	0	2.0
02/28/86	19.0	0	0	2.1
03/07/86	18.0	0	0	1.9
03/14/86	29.0	.8	0	3.1
03/24/86	21.0	1.2	0	2.0
03/28/86	19.0	0	0	2.4
04/07/86	17.0	0	0	1.9
04/15/86	20.0	0	0	2.0
04/25/86	26.0	0	0	2.3
05/02/86	27.0	3.5	0	2.2
05/16/86	24.0	0	0	2.1
05/30/86	17.0	0	0	1.4
06/10/86	20.0	0	0	1.7
06/23/86	25.0	0	5.1	1.3
07/02/86	27.0	0	0	1.5
08/07/86	19.0	0	0	1.4

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TABLE A-2

ANALYTICAL RESULTS
FOR
RECOVERY WELL TWO (RW-2)

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
05/07/86	0	0	0	1.7
05/16/86	21.0	0	0	1.3
05/30/86	29.0	0	0	1.2
06/10/86	20.0	0	0	1.7
06/23/86	29.0	0	0	1.2
07/02/86	28.0	0	0	1.1
08/07/86	18.0	0	0	1.0

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TABLE A-3

ANALYTICAL RESULTS AND
REMOVAL EFFICIENCIES FOR
RECOVERED GROUND-WATER
AFTER AERATION

Date Sampled	Concentrations in ppb				Removal Efficiency (%)
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene	(in-out/in x 100)
04/18/85	0	0	0	0	100
04/19/85	0	0	0	0	100
04/20/85	32	0	0	0	---
04/21/85	7.1	0	0	0	48
04/22/85	2.0	0	0	0	63
04/23/85	0	0	0	0	100
04/24/85	24.0	0	0	0	---
04/25/85	2.0	0	0	0	97
04/26/85	5.3	0	0	0	96
04/27/85	8.1	0	0	0	95
04/29/85	13.0	0	0	0	93
05/01/85	11.0	0	0	0	94
05/03/85	7.7	0	0	0	96
05/07/85	5.4	0	0	0	95
05/10/85	4.6	0	0	0	95
05/14/85	35.0	0	0	0	66
05/20/85	2.0	0	0	0	97
05/24/85	1.0	0	0	0	99
05/28/85	4.5	0	0	0	93
05/31/85	0	0	0	0	100
06/04/85	0	0	0	0	100
06/07/85	0	0	0	0	100
06/11/85	6.1	0	0	0	90
06/14/85	0	0	0	0	100
06/18/85	0	0	0	0	100
06/21/85	0	0	0	0	100

8713:SJTBRGWJ/1

TABLE A-3 · Continued

Date Sampled	Concentrations in ppb				Removal Efficiency (%)
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene	(in-out/in x 100)
06/25/85	7.8	0	0	0	86
06/28/85	13.0	0	0	0	73
07/02/85	0	0	0	0	100
07/05/85	0	0	0	0	100
07/09/85	9.0	0	0	0	77
07/12/85	0	0	0	0	100
07/16/85	0	0	0	0	100
07/19/85	0	0	0	0	100
07/23/85	4.0	0	0	0	90
07/26/85	0	0	0	0	100
07/30/85	19.0	0	0	0	51
08/02/85	0	0	0	0	100
08/06/85	0	0	0	0	100
08/09/85	0	0	0	0	100
08/16/85	4.6	0	0	0	90
08/23/85	2.9	0	0	0	98
08/30/85	2.7	0	0	0	92
09/06/85	3.8	0	0	0	87
09/13/85	4.1	0	0	0	90
09/19/85	4.5	0	0	.3	88
10/04/85	3.4	0	0	.2	90
10/11/85	4.9	0	0	.2	86
10/21/85	3.1	0	0	0	92
10/28/85	2.4	0	0	.2	92
11/04/85	1.0	0	0	.2	93
11/11/85	2.3	0	0	.2	92
11/20/85	2.0	0	0	.2	92
11/26/85	2.7	0	0	.3	90
12/03/85	14.0	0	0	.5	52

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TABLE A-3 - Continued

Date Sampled	Concentrations in ppb				Removal Efficiency (%)
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene	(in-out/in x 100)
12/09/85	7.4	10.0	0	.6	38
12/20/85	6.9	0	0	.7	73
01/03/86	2.0	0	0	0	93
01/13/86	9.5	4.8	0	.6	47
01/24/86	6.2	0	0	.5	70
01/31/86	6.8	0	0	.8	68
02/13/86	7.2	0	0	.5	69
02/21/86	5.2	0	0	.6	76
02/28/86	2.5	0	0	.4	86
03/07/86	3.3	0	0	.5	81
03/14/86	5.3	0	0	.7	82
03/24/86	13.0	0	0	.2	45
03/28/86	2.0	0	0	.3	89
04/07/86	0	0	0	.3	98
04/15/86	0	0	0	0	100
04/25/86	0	0	0	0	100
05/02/86	3.4	1.6	0	.5	83
05/16/86	7.0	0	0	.4	72
05/30/86	.5	0	0	.5	95
06/10/86	1.9	0	0	0	91
06/23/86	1.7	0	0	.3	94
07/02/86	0	0	0	0	100
08/07/86	7.7	0	0	.7	59
			Average Removal Efficiency		87.2%

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TABLE A-4

ANALYTICAL RESULTS
FOR
STORMWATER RETENTION BASIN

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
04/18/85	0	0	0	0
04/19/85	1.0	0	0	1.0
04/20/85	0	0	0	0
04/21/85	7.8	0	0	0
04/22/85	0	0	0	0
04/23/85	5.0	0	0	0
04/24/85	10.0	0	0	0
05/01/85	7.7	0	0	0
05/03/85	7.4	0	0	0
05/10/85	4.6	0	0	0
05/14/85	0	0	0	0
05/17/85	14.0	0	0	0
05/20/85	0	0	0	0
05/24/85	1.0	0	0	0
05/28/85	0	0	0	0
05/31/85	0	0	0	0
06/04/85	8.2	0	0	0
06/07/85	9.0	0	0	0
06/11/85	7.1	0	0	0
06/14/85	0	0	0	0
06/18/85	0	0	0	0
06/21/85	0	0	0	0

8713:SJTBSWRJ/1

TABLE A-4 - Continued

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
06/25/85	0	0	0	0
06/28/85	21.0	0	0	0
07/02/85	4.6	0	0	0
07/05/85	0	0	0	0
07/09/85	0	0	0	0
07/12/85	0	0	0	0
07/16/85	0	0	0	0
07/19/85	5.3	0	0	0
07/23/85	0	0	0	0
07/26/85	0	0	0	0
07/30/85	0	0	0	0
08/02/85	0	0	0	0
08/06/85	0	0	0	0
08/09/85	7.1	0	0	0
08/16/85	0	0	0	0
08/23/85	4.5	0	0	0
08/30/85	0	0	0	0
09/06/85	0	0	0	0
09/13/85	0	0	0	0
09/19/85	0	0	0	0
10/04/85	6.3	0	0	0
10/11/85	1.8	0	0	0
10/21/85	0	0	0	0
10/28/85	1.8	0	0	0
11/04/85	5.8	0	0	0
11/11/85	0	0	0	0

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TABLE A-4 - Continued

Date Sampled	Concentrations in ppb			
	Trichloroethylene	1,1,1-trichloroethene	Chloroform	Perchloroethylene
11/20/85	2.5	6.8	0	0
11/26/85	18.0	16.0	0	0
12/03/85	0	0	0	0
12/09/85	2.6	0	0	0
12/20/85	3.5	0	0	0
01/03/86	2.0	0	0	0
01/13/86	6.6	0	0	.6
01/24/86	4.1	0	0	.3
01/31/86	5.6	0	0	0
02/13/86	8.3	0	0	0
02/21/86	2.8	0	0	0
02/28/86	4.9	0	0	.5
03/07/86	6.0	0	0	0
03/14/86	32.0	0	0	0
03/24/86	11.0	1.1	0	.2
03/28/86	0	0	0	0
04/07/86	3.8	0	0	.2
04/15/86	16.0	0	0	0
04/25/86	0	0	0	0
05/09/86	1.4	0	0	0
05/16/86	5.2	0	0	0
05/30/86	0	0	0	0
06/10/86	2.1	0	0	0
06/23/86	0	0	0	0
07/02/86	1.8	0	0	0
08/07/86	0	0	0	0

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ORIGINAL
(RED)

Ground Water Route Work Sheet

(b) (5)

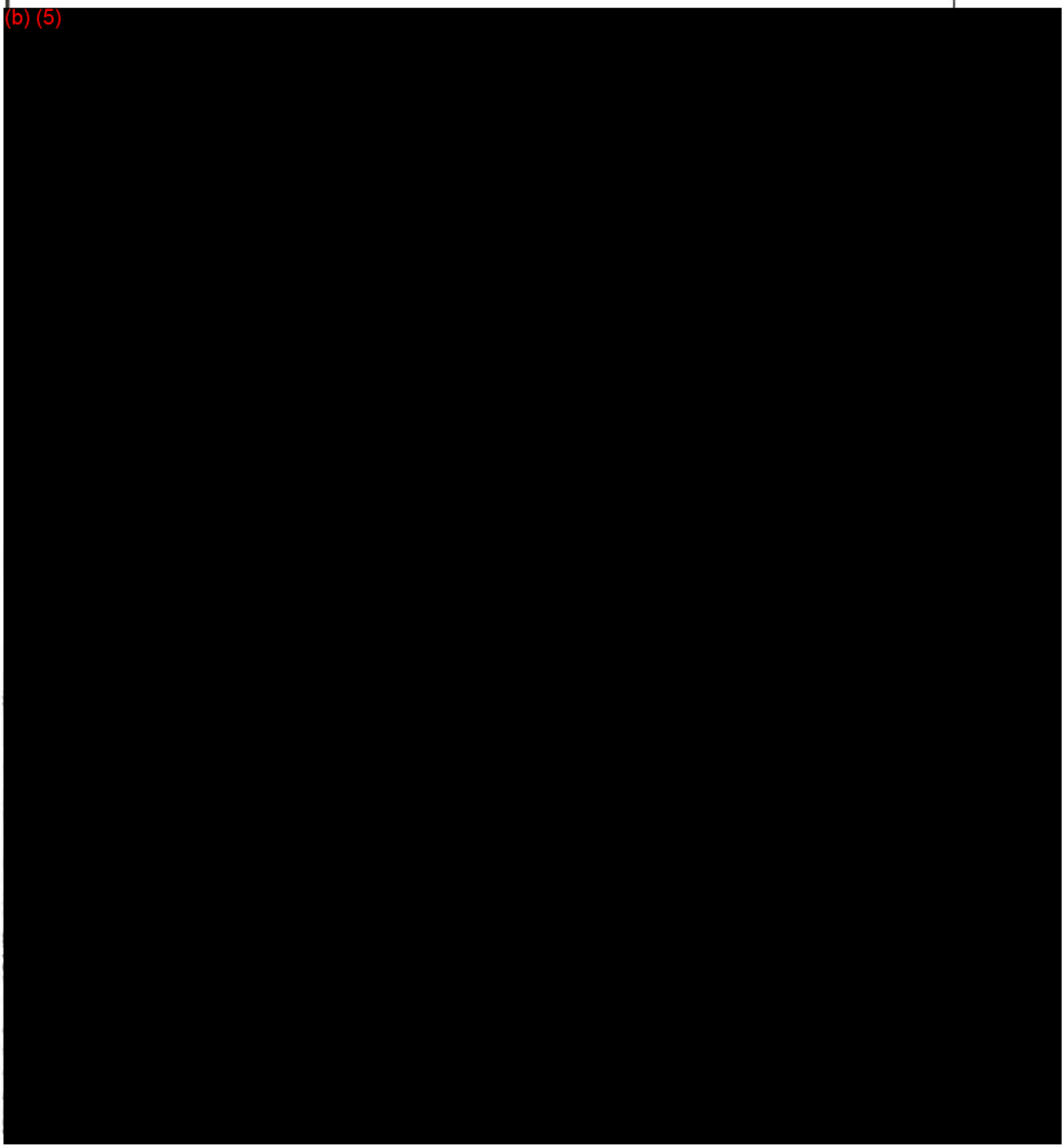

FIGURE 2
GROUND WATER ROUTE WORK SHEET

ORIGINAL
(RED)

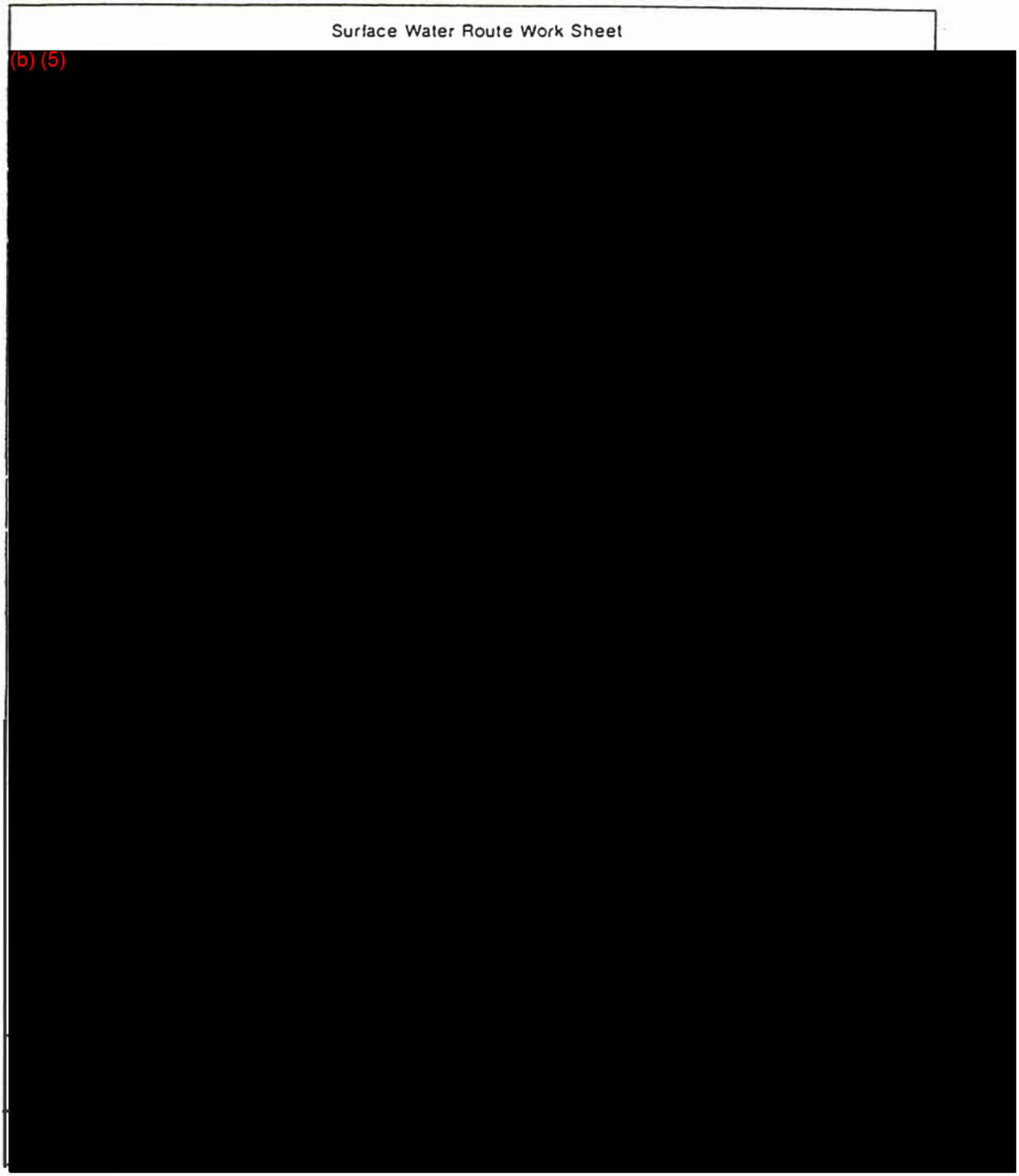

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

ORIGINAL
(RED)

APR 0 4 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Eileen Hack
Environmental Scientist
Delaware DNREC
Division of Air & Waste Management
715 Grantham Lane
New Castle, DE 19720

RE: Camdel Metals
DSN: DE-115

Dear Ms. Hack:

We are forwarding to you two copies of the draft HRS report for the above referenced project. To ensure the inclusion of your comments in any revision, please have your staff review the report and provide their written comments to me by May 5, 1986. Any comments received after this date will be kept on file for future consideration.

As you know, these draft reports should not be reproduced or released to anyone outside of your agency. When you have completed your review and provided your comments, please return the copies of the report to me by certified mail.

If there are any questions concerning this report, please call me at 215/597-3153. Thank you.

Sincerely,

Laura A. Boornazian
Site Investigation & Support Section